ILLINOIS
Dental Journal

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Volume 15 Number 12

December, 1946

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for a

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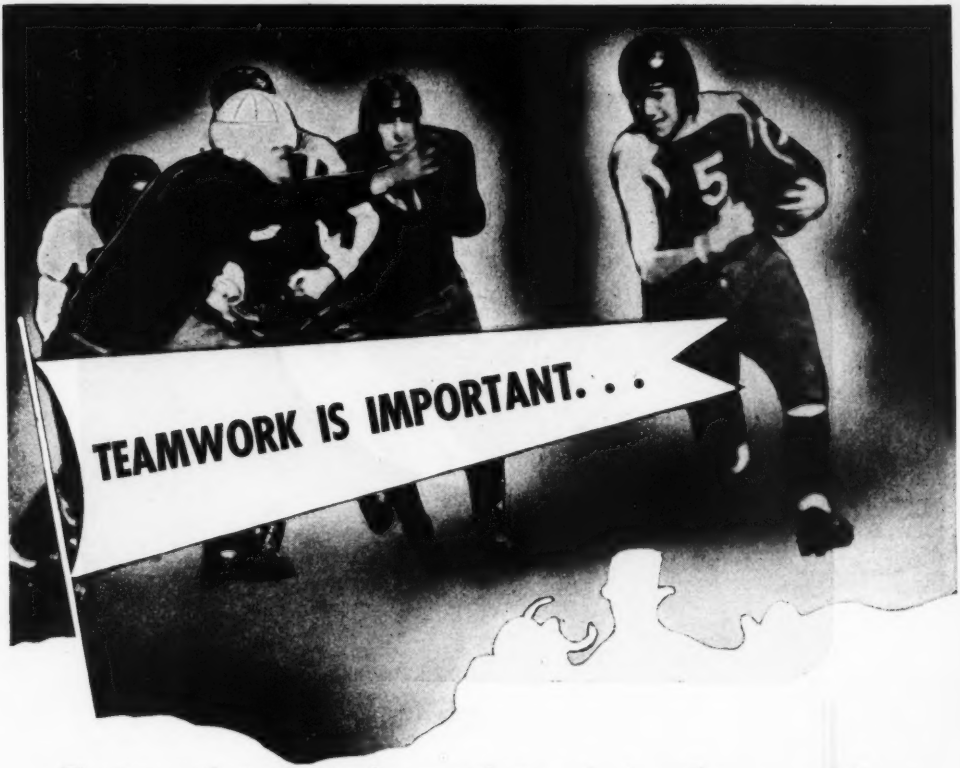
Happy New Year

M. W. Schneider



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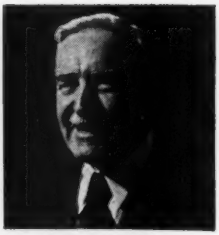

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VOLUME 15 DECEMBER, 1946 NUMBER 12

Present Status of the Inlay Casting Technic*

By Eugene W. Skinner, Ph.D.†

Although there is some controversy as to who cast the first gold inlay, W. H. Taggart is generally given credit for first introducing the idea to the dental profession. Taggart realized that inlay gold alloys shrink upon solidifying, and, therefore, that there was a possibility that the gold inlay would not fit, as cast by his technic. However, he states in one of his papers:[1] "While it (the gold) is in this freshly molded condition the pressure is maintained for a few moments, in order to allow the molden gold to thoroughly congeal; either this continued pressure prevents the gold from contracting or the amount of expansion in the hot mold is equal to it; at any rate the filling fits." These observations of Taggart are probably the first ever made concerning the compensation for casting shrinkage. Obviously, if a casting shrinks during and after solidification, the mold must be expanded in order to compensate for this shrinkage. The manner and magnitude of this compensation are in a nutshell the entire problem of accurate casting.

We should not blame Dr. Taggart for being ignorant of the forces involved in the thermal contraction of a metal, and of the fact that such a contraction could possibly be affected by the air pressures used by him. Nor did the investment used by Taggart supply sufficient compensation, so far as we know, to overcome the shrinkage of the gold. It soon became evident to the more critical members of the profession that the gold inlays of that period did not fit. At least two members of the profession of that period, namely C. S. Van Horn and Weston A. Price, immediately began to improve the situation. In 1910, Van Horn published an epochal paper[2] dealing with the fundamentals of shrinkage compensation in casting. In this and subsequent papers, he discussed the dimensional changes of the wax pattern, the investment materials, and their influence on the accuracy of the cast inlay. Although he recognized that the gold alloy shrank on solidifying, he did not know the value of this shrinkage. Nevertheless, he must be given the credit for presenting the first practical shrinkage compensation technique. He obtained the compensation by mixing the investment in warm water (115°-120°F.); the invested pattern was then allowed to set under

*Read before the 82nd annual meeting of the Illinois State Dental Society, Chicago, September 19, 1946.

†Professor of Physics, Northwestern University Dental School.

1. Taggart, W. H., A New and Accurate Method of Making Gold Inlays. Dent. Cos. 49:1121 (Nov.) 1907.

2. Van Horn, C. S., Casting: A Review and Commentary, Including a Technique. Dent. Cos. 52:873-881 (Aug.) 1910.

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water in a bath at a temperature of 110°F. In this manner, the wax pattern expanded thermally, and thus the mold was made larger by the amount of this expansion. The mold was then heated to redness and the casting was made. Van Horn's technique was basic in principle, and several features of it are used at the present time. If the investment materials used by Van Horn had been of the present-day quality, he undoubtedly would have seen the faults of his technique, and would have corrected them himself.

Price published a paper[3] in which he listed twelve variables which must be controlled in casting. The theoretical part of this paper is classical, and is worth reading and re-reading by any modern research worker in this field. Price further attempted to evaluate the quantitative value for the casting shrinkage of gold. In spite of his accurate and ingenious equipment, we know now that he came closer to determining the thermal shrinkage of pure gold than he did its casting shrinkage.

Coleman's Work a Major Step

The next major research in connection with this problem was the work of Coleman at the National Bureau of Standards, which culminated in the famous publication[4] "Research Paper No. 32." Coleman determined the linear thermal expansions of many of the inlay waxes and investments on the market at that time. He also, for the first time, determined the casting shrinkage of gold alloys by a method comparable to that used by a dentist. He presented the linear percentage casting shrinkage as 1.25 per cent, a figure which was supposedly independent of the temperature of the mold and of the temperature of the molten gold at the time of casting.[5]

With all of these data at his command, Coleman was able to present a casting technique with shrinkage compensation values of a quantitative nature. Later, a specification[6] was set up for dental investments by the American Dental Association Research Commission. As a result of this specification and the general demand of the profession, a distinct improvement in inlay investments resulted, to the extent that the use of thermal wax expansion as a part of the casting technique was eliminated, and the total compensation was obtained by the combination of the setting and thermal expansions of the investment mold; this procedure is the general practice at the present time.

Recent Investment Technique

The technique most in vogue at present is, then, to invest the pattern in an asbestos lined ring. The asbestos lining supposedly allows the setting expansion of the investment to take unimpeded. The linear magnitude of this change may be 0.3-0.4 per cent. The mold is then heated to 1300°F. (700°C.), the wax is eliminated, and a linear expansion of 1.0 to 1.35 per cent takes place, depending upon the composition of the investment. The castings so obtained may be accurate to the eye, but few, if any of them, will withstand accurate scrutiny under magnification. Even under a hand lens, most of the castings obtained by this method exhibit open margins. This observation raises the question as to how accurate an inlay casting should be. Many inlays cast by this method have given excellent service, but many have failed as well. Space does not permit an elaboration of this point, but it is the basic assumption of this paper that the greater the actual accuracy of the fit of the inlay, the more serviceable it is. On this basis, any improvement over the present method of casting is important.

3. Price, W. A., The Laws Determining the Behavior of Gold in Fusing and Casting. Dent. Cos. 53:265-294 (March) 1911.

4. Coleman, R. L., Physical Properties of Dental Materials. Research Paper No. 32, U. S. Gov. Printing Office (1928).

5. Ibid., p. 893.

6. Taylor, N. O., Paffenbarger, G. C., and Sweeney, W. T., Dental Inlay Casting Investments: Physical Properties and a Specification. J.A.D.A. 17:2266-2286 (Dec.) 1930.

There are at least two basic causes for the discrepancies in the fit of modern gold inlays: (1) lack of smoothness of the casting, and (2) improper compensation for the casting shrinkage.

Causes for Surface Roughness

Let us assume for the sake of argument that the proper shrinkage compensation is employed, and that the lack of accuracy of the inlay is caused by surface roughness. At least six causes for surface roughness on castings have been recognized:[6] (1) coarse investment; (2) too high a proportion of water used in the mix; (3) excessive vibration of the pattern during the investing process; (4) unclean patterns; (5) air bubbles in the investment, and (6) a too rapid rate of burning out. If a dental investment is used which meets the requirements of the American Dental Association Specification No. 2, the method for the elimination of these causes is obvious, and it is practiced routinely by the careful operator.

It is possible, however, that minute, even microscopic surface irregularities may prevent the inlay from seating properly. This factor has been studied by Crawford,[7] and he suggests that different compensations for different types of inlays may be necessary in order to allow for such surface irregularities. For example, if the cavity preparation exhibits parallel or nearly parallel axial walls, any slight surface irregularity will increase the friction between the cavity wall and the inlay, and the casting will not seat. On the other hand, if the axial walls are converging, an inlay with a similar surface irregularity will seat without difficulty. In order to allow for these differences, the first-mentioned inlay will require a greater compensation than will the latter. Crawford intimates that these differences in cavity preparation may be the reasons for the different compensations advocated in the cristobalite-control powder casting technique.[8]

The elimination of this type of surface roughness is not easy. According to a preliminary research by C. E. Pomes in the physics laboratory of Northwestern University Dental School, the smoothness and detail of the inlay surface may vary with the composition of the gold alloy and the type of investment used. The best approach to the subject so far published is that of Hollenback.[9] He has observed in his wide experience that castings made at 1300°F. (700°C.) exhibited a rougher surface than those made at a lower temperature of approximately 840°F. (450°C.). The complete elimination of the wax at the lower temperature presents a problem, as well as the fact that the shrinkage compensation will be less if the casting is made into a mold at a lower temperature. However, if smoother castings can be obtained at this temperature, any technique which employs such a temperature is of considerable value.

Hygroscopic Casting Technique

The only casting method so far devised which will allow sufficient compensation at a low mold temperature is the hygroscopic casting technique, first developed by Scheu.[10] Scheu discovered that certain investments would expand as much as 2 per cent or more if they were allowed to set under water. He was able to control this expansion by the length of time the investment was allowed to set under water. By the use of this expansion, he was able to compensate for the shrinkage of gold, and yet a low wax elimination temperature could be used. Scheu's castings were extremely accurate and smooth; furthermore the amount of compensation needed was independent of the size or shape of the casting. In other

7. Crawford, W. H., Selection and Use of Investments. J.A.D.A. 27:1462 (Sept.) 1940.

8. Phillips, D. W., Controlled Casting. J.A.D.A. 22:439-451 (March) 1935.

9. Hollenback, G. M., Precision Gold Inlays Made by a Simple Technic. J.A.D.A. 30:99-109 (Jan.) 1943.

10. Scheu, C. H., A New Precision Casting Technic. J.A.D.A. 19:630-633 (April) 1933. Controlled Hygroscopic Expansion of Investment. J.A.D.A. 22:452-455 (March) 1935.

words, the same compensation was used regardless of the angle of the axial walls of the cavity preparation. Scheu also claimed that different types of gold alloy required different amounts of shrinkage compensation.

Hollenback[9] later perfected and simplified this technique until it is today, in the hands of an operator who understands it, the most accurate method for the casting of gold inlays. The procedure employed in the Hollenback technique is briefly as follows:

Procedure to Be Followed

An accurate wax pattern is prepared. The water and investment are accurately proportioned and mixed in a vacuum. The pattern also is invested in a vacuum, in order to insure freedom from surface roughness due to air bubbles. The ring with the investment is immediately immersed in a water bath at 98°F. (37°C.) and allowed to remain for 30 minutes. The sprue pin is then removed, and the wax is eliminated in boiling water by drawing it out through the sprue with an ingenious suction device. The mold is then heated to approximately 840°F. (450°C.) and the inlay is then cast without cooling the mold. Like Scheu, Hollenback does not find it necessary to vary the shrinkage compensation with the type of cavity preparation; he also finds it necessary to vary the compensation according to the type of gold used.

The castings obtained by Hollenback are superbly smooth and accurate. The author has had occasion to study the fit of an "inlay" cast to fit an intricate stainless steel model. Under a magnification of 100, only a very few openings between the steel and the gold could be discerned at their points of contact. These castings are undoubtedly the most accurate ever cast.

Scientifically, however, this casting technique leaves much to be desired. Very little is known about the mechanism or control of the hygroscopic expansion. Hollenback[11] has shown that it increases in magnitude as the amount of water mixed with the investment is decreased. Degni[12] proved that an increase in the temperature of the water bath increases the expansion, and that for a given water-investment ratio, the greater the quartz content of the investment, the greater is the hygroscopic expansion. He also showed that its magnitude is reduced by frictional retention of any sort. Degni believes that it may be accounted for by a colloidal phenomenon, but the evidence is not entirely clear on this point.

The composition of the investment undoubtedly affects this type of expansion considerably. For example, Pomes* has determined the hygroscopic expansion of eleven different commercial investments, and has found that it varied from 0.6 per cent to 2.5 per cent, depending upon the particular investment. This fact leads one to conjecture as to whether a manufacturer can standardize this particular property of his investment from one batch to another.

Metal's Expansion Unknown

From an academic standpoint, the chief objection to the technique is that, as yet, the amount of compensation attained is not known. Scheu[10] places the linear expansion of the metal in the neighborhood of 1.6 per cent; in any event, it is probably much higher than the linear casting shrinkage of 1.25 per cent given by Coleman.

In other words, it is doubtful, in the light of the accurate castings made by Hollenback, that the assumption made at the start of the discussion of surface roughness on castings is true, namely, that the proper compensation is being used in the present investment thermal expansion technics. It was this doubt that prompted Hollenback, in conjunction with the author, to redetermine the

11. Hollenback, G. M. Paper read at the Midwinter Meeting of the Chicago Dental Society, 1946.

12. Degni, Francesco. Study of Hygroscopic Expansion of Dental Investments. Thesis. Northwestern University Dental School, 1946.

*To be published.

casting shrinkage of gold and its alloys.[13] A remarkable precision was attained in this study. It was found that the casting shrinkage varied with the particular type of gold used. The lowest value found for a gold alloy containing 19.8 per cent platinum was 1.30 per cent. The other values were all higher than this, the highest being pure gold with a casting shrinkage of 1.67 per cent.

Hollenback vs. Coleman

It is, of course, dangerous to apply these figures directly to inlay castings, but certainly the correct casting shrinkage value is higher than that given by Coleman. Coleman measured the linear casting shrinkage of rods, 0.12 inch in diameter and 3.25 inches in length, whereas Hollenback used rods 0.14 inch in diameter and 1 inch in length. It is probable that Coleman's value for the linear casting shrinkage was lower than that of Hollenback because of the greater length of his specimens. According to Coleman,[14] the magnitude of the casting shrinkage is determined by two different, though related phenomena: (1) There may be sufficient interlocking between the casting and the walls of the mold to hold and even stretch the casting during the early stages of cooling, while the metal is still weak. (2) Since the outside of the casting cools first, this interlocking will allow more molten metal to pour into the mold space, inside the interlocked shell of solidified metal. In any event, the casting shrinkage is always less than the thermal shrinkage. Since the ratio of the surface area to the volume of the specimens used by Coleman is greater than that used by Hollenback, it is conceivable that the interlocking effect was greater for Coleman's specimens, and consequently the casting shrinkage would be less. The shape and bulk of the casting may, then, affect the casting shrinkage. The specimens used by Hollenback perhaps approach more closely the bulk conditions of an inlay, but further research is needed to determine whether the linear casting shrinkage values presented by Hollenback can be applied directly to the shrinkage of gold inlays. As previously stated, however, Hollenback has demonstrated the necessity for the use of different shrinkage compensations for different types of alloys. Certainly, Hollenback's values are of the correct order of magnitude, and it is possible that the differences which may occur between various shapes of castings may be within the limits of error in the Hollenback casting technique.

From a theoretical standpoint, there must be a slight error in the castings made by the Hollenback technique, due to an unsymmetrical expansion of the mold. For example, when the hygroscopic technique is employed, according to Hollenback's directions, the expansion is so great that the investment is actually pushed out of the open end of the casting ring. It is obvious that this expansion is confined at the closed end, and, to a certain extent, along the sides, since the asbestos liner cannot possibly allow completely for such a large expansion. The casting should, therefore, be distorted along the axis of the casting ring. Such distortions are occasionally noted, but they are extremely small and difficult to measure. This factor is being considered, and will be remedied by Hollenback in the near future.

Summary and Conclusions

This foregoing discussion can be best summarized for the casual reader by means of questions and answers. It must be noted, however, that few of the questions can be answered fully at the present time. However, the answers are being sought, since research in this field has been greatly stimulated by Hollenback's work.

1. Does the surface smoothness of a casting affect its fit? The answer is obviously "yes," but many castings which

13. Hollenback, G. M., The Linear Casting Shrinkage of Gold and Its Alloys. Thesis. Northwestern University Dental School (1945).

14. Coleman, *op. cit.* p. 910.

appear smooth to the eye exhibit a minute surface roughness under the microscope which probably affects the accuracy of the inlay to a considerable degree, provided the technique is sufficiently accurate to detect the difference.

2. Will all investments produce the same smoothness on castings? According to the preliminary work of Pomes, the type of investment may affect the surface of the casting. The reasons for this effect are not clear, and further study is needed.

3. Does the composition of the gold alloy affect the surface smoothness of the casting? In all probability it does to some extent, but more research is needed in this regard before any definite information can be given.

4. Does the temperature to which the mold is heated before casting affect the surface smoothness of the casting? According to Hollenback, castings made in a mold at a low temperature (approximately 840°F.) are smoother than those made at a mold temperature of 1300°F. (700°C.). A careful, systematic study should be made of this factor, however.

5. What is the linear casting shrinkage of inlay gold alloys? According to Coleman, the linear casting shrinkage is 1.25 per cent, but the more recent determinations of Hollenback place the value higher than this.

6. Are Hollenback's values for the linear casting shrinkage of gold alloys applicable to practical inlay castings? Certainly the differences in casting shrinkage found by Hollenback for different alloy compositions are detectable in inlays made by the hygroscopic casting technique, but further research is necesssary to determine whether the absolute values are directly applicable. However, it follows from Hollenback's research that these values are relatively correct.

7. What is the actual shrinkage compensation involved in the Hollenback casting technique? The actual compensations involved are not known at the present time, and this fact is the inherent weakness of this technique from a fundamental scientific standpoint.

8. Can the hygroscopic expansion of an investment be standardized? Since neither the cause nor the exact magnitude of the hygroscopic expansion are known, it is difficult to understand how a manufacturer can standardize his investment for this property, except by superficial and extremely empirical methods.

9. What is the present status of the inlay casting technique? It is extremely chaotic. The generally accepted value of Coleman for the linear casting shrinkage has been challenged. Extremely accurate castings are being made with a technique that is almost entirely rule-of-thumb, and the scientific principles underlying it are not understood. Much fundamental research is needed to clarify the situation. The meticulous dentist must discard many of his traditional ideas about casting, and think the matter through in the light of the new data. More accurate castings will finally result, but the new casting techniques are as yet more or less in an experimental stage of development. No dentist should attempt to use them until he understands them thoroughly. — *311 East Chicago Avenue, Chicago 11, Illinois.*

Polishing Amalgam Restorations

By T. M. Graber, D.D.S.

Dr. Graber's timely article on this much dicussed subject will be of great interest to all.

Polishing of amalgam restorations has often been relegated by many practitioners to so-called "high class dentistry." A nice mirror luster is very pretty, but considering an extra visit, added chair time, and no added fee, many men have felt it isn't worth the trouble. This is not a plea for polishing amalgams—each man knows best the type of practice he has, and the time available for restorative work; but there are certain advantages that accrue from the employment of a simple, thorough, yet speedy technique. The dividends are accurate margins, removal of "amalgam fringe," relief of overhanging proximal portions, a smoother surface that is more resistant to retention of plaques which might cause caries and improved esthetics satisfying to both the operator and patient.

If the cavity preparation is poorly extended, enamel rods undermined, or amalgam loosely condensed, no amount of polishing will make it a good restoration. But even in such cases, polishing may improve these hurriedly placed amalgams, prolonging the life of the filling and preventing irritation of surrounding tissue by possible overhanging margins. In such cases, the restorations also benefit by removal of amalgam overlays that may have found their way into unextended sulci.

Granted a well extended and prepared cavity, adequate trituration and condensation, and approximate restoration of the tooth anatomy, the problem is to finish down the filling without either ruining the margins or destroying the carving. Plug finishing burs are not the answer, for they destroy both margins and anatomy. Brushes or stones, alone, or rubber impregnated discs or cups alone, merely temporize the situation, satisfying only the time element. This is evident because of the varying degrees of resistance to polishing agents. Amalgam is softer than the calcified structure of enamel and wears more rapidly under abrasive action. Indiscriminate use of polishing agents and techniques may accentuate deficiencies of restoration. Direction, speed and pressure of abrasive forces are important.

The following technique will give satisfaction with intelligent use. After plugging and carving a filling, if the operator will take a piece of dry cotton and gently run it over the isolated dry surface of the filling before dismissing the patient. This operation will provide a smoother surface for polishing at the next visit. At least 24 hours should elapse before attemping to polish a filling. The armamenteria consists of the following items:

Class I Cavities

Two dappen dishes
Medium fine pumice
Tin oxide
Small brushes (contra-angle)
Impregnated sulci discs
Rubber polishing cups
Pear-shaped mounted stone

Class II & III (In addition)

Sand paper discs and mandrel
Metal and linen strips
Amalgam files (optional)

(1) First check the occlusion for high spots. Remove these with a mounted stone.

(2) The dappen dish is filled with pumice and enough water is added to

form a thick paste. A few drops of oil of peppermint may be added for flavor, if desired. Tin oxide or a similar commercial preparation is placed dry in the other dappen dish. Insert a small brush in the contra-angle handpiece and immerse brush in pumice paste. The motor is run at half speed and the end bristles are placed so that maximum contact is made with the surface of the amalgam. Pressure is applied so that the peripheral bristles direct the pumice into the carved sulci of the filling, with little or no pressure on the margins. This polishes the inaccessible portions in 1 to 3 minutes.

(3) A pear-shaped mounted stone is run over the margins, removing fringes, excess, etc. Be careful to avoid sulci carving of filling just pumiced.

(4) The margins are polished down with an impregnated sulci disc or rubber cup and pumice. If the disc is used, it should lie as flat as possible against the surface, and both disc and cup should be rotated from the tooth to the amalgam. This is important.

(5) Rinse and dry the surface of the tooth, isolate, and apply tin oxide with either a rubber cup or felt wheel. Total consumed time should not exceed five minutes.

Class II restorations are polished in like manner. After the occlusal portion is finished, the proximal margins are disced and finished down with linen strips. Use of amalgam files is optional. The proximal surfaces are then pumiced with impregnated discs or cups, and final luster given with tin oxide.

The following points should be noted:

(1) Anatomy of restoration is retained by use of small brushes which reach sulci without removing surrounding filling structure, as in the case of plug finishing burs.

(2) Brushes and cups and discs are revolved from tooth to filling to prevent "cupping" of restoration margins.

(3) The margins are not finished down first. The sulci are polished first and then the margins are stoned. This corrects initial discrepancies plus any irregularities resulting from polishing the sulci.

(4) Margins that have been stoned down by a fine grit mounted stone are quickly finished to a high luster if the inaccessible parts of the restoration are polished previously.

(5) Care must be exercised not to overheat the amalgam. This causes undue expansion, brings mercury to the surface and weakens the structure generally and the margins particularly. Impregnated rubber discs are especially quick to heat when pressure is applied during use. A constant stream of water on the revolving disc will eliminate this danger.

(6) The final luster gained by use of tin oxide is temporary in nature and primarily for esthetic value. Don't gloss over irregularities for they will show up again very soon. Be sure to attain a smooth surface by pumicing thoroughly, for that is the finish that will be retained.

Recent Review and Discussion of Penicillin*

By George Edward Meyer, D.D.S., Chicago

A new crystalline penicillin is now available which does not require refrigeration and which when dissolved in saline solution is much less painful during injection than previous penicillin preparations have been. Its potency is measured on the basis of exact weight and represents the first penicillin whose exact potency is known. The duration of its potency in the dry state is as yet unknown but it is fair to assume that because the compound is crystalline it will have the same stability as all ordinary chemical compounds. It can be predicted that in the near future all preparations of penicillin to be marketed will be of a crystalline nature.

Retardation of Absorption

Beeswax with peanut oil has been known for some time as a vehicle for prolonging the time required for absorption of parenterally administered penicillin. This retardation permits therapeutic blood levels, capable of combating most common severe infections, to be established within an hour and maintained for from sixteen to twenty-four hours or longer. The difficulty in its administration, however, arises from the fact that should any moisture come in contact with the penicillin-beeswax-oil mixture, crystallization of the penicillin takes place and mechanical difficulties in the injection procedure are created. This difficulty has been overcome by providing penicillin-beeswax-oil mixture (Romansky formula) in a sterile cartridge-type disposable syringe. With this unit no sterilization of needle or syringe is required, the possibility of the presence of moisture is eliminated and injections can be made rapidly. This preparation of pencillin is supplied only as 300,000 Oxford units per cubic centimeter in individual cartridge type syringes. Present practice is to administer one injection in twenty-four hours for acute gonorrhea and this constitutes complete treatment and cure in more than 95 per cent of patients. For infections such as pneumococcus pneumonia, various hemolytic streptococcic infections and meningicoccal infections, one injection is given every twenty-four hours for as long as required. This mixture is not adapted for infections such as subacute bacterial endocarditis or other diseases in which prolonged therapy may be required. It has been used experimentally in the treatment of early syphilis and present reports indicate that it is almost if not equally as efficacious as saline solutions of penicillin injected every four hours.

Buffer Unnecessary

Buffered Penicillin Tablets.—Experiments taking place throughout the country are proving that it is unnecessary to buffer penicillin tablets to be administered by mouth. The blood levels obtained with unbuffered penicillin are identical with those obtained with any of the numerous buffered tablet preparations now available. Apparently the gastric juice has much less of an inactivating influence than was formerly thought to be true. The Committee on Chemotherapeutics and other Agents of the National Research Council has as yet not permitted manufacturers to omit buffer, but in all probability will do so within the near future. Several manufacturers of penicillin have buffered tablets in experimental dosage available for distribution upon request.

Dosage of Penicillin Tablets.—When oral penicillin is administered, it should be given in doses five times greater than the amount that would be injected. This will produce penicillin blood levels iden-

*Reprinted from Journal of Oral Surgery, Vol. 4, October 1946.

tical with those obtained with parenteral therapy. This is not to say, however, that oral penicillin can be or should be substituted at will for injection therapy. Present recommendations confine the use of oral penicillin in the five to one ratio to the less severe infections caused by the more penicillin-sensitive organisms and to those conditions in which past experience has proved that parenteral therapy will not be required for prolonged or intensive treatments.

Success of Aerosolization

Aerosol Penicillin.—Aerosolization of solutions of penicillin by means of a nebulizer has been used with dramatic success in the treatment of various pulmonary infections including pneumonia, acute bronchitis, acute and chronic bronchiectasis and pulmonary abscess and for prophylaxis before and after operations on the lung for both bronchiectasis and pulmonary abscess. Tremendous concentrations are obtained within the alveoli by this method when pressure to drive the aerosolized penicillin is obtained by either oxygen or steam under pressure. Penicillin can be absorbed into the blood stream through the alveolar membrane when administered by this method so that aparently both systemic and local effects are obtained. This method of administering penicillin may be of interest in dentistry when the accidental aspiration of infected material from the oral cavity occurs.

Where intense local concentrations of penicillin are desired in the bronchial tree, penicillin may be instilled supraglottally, directly with a canula attached to a syringe, in a technic similar to that used for the supraglottal installation of lipiodol for bronchography.

Penicillin Suppositories.—Since penicillin acts directly on infected mucosal tissues it has been incorporated in suppositories for use in gynecologic infections, especially those of the lower generative tract, such as cervicitis and endocervicitis. Its use in juvenile vaginitis caused by the gonococcus is to be anticipated.

Despite the enormous quantities of penicillin that have been administered in large doses and by various methods, the reports of true toxicity to the drug are singularly infrequent. The commonest side effects (and these hardly may be called true toxic reactions) are urticaria, chills and fever. It has not been determined whether these reactions are caused by impurities in penicillin preparations or represent a hypersensitivity on the part of the person receiving the antibiotic, or whether both factors are responsible at different times. It is generally felt that if penicillin is indicated, its administration should be continued in spite of the development of urticaria, although a change of brand should be made. An occasional case of severe serum sickness, angioneurotic edema or eczema has also been reported.

Side Reactions

Side reactions to oral penicillin tablets (buffered) have been reported and include cramps, nausea, vomiting and diarrhea, the latter occasionally being severe. It is generally felt that these side effects are not caused by the penicillin of itself, but by the buffers that are incorporated with the drug. When penicillin is applied topically to the skin and mucosal surfaces, side reactions may also occur. The use of penicillin lozenges has resulted in various types of acute lesions of the mouth which subside promptly with discontinuation of the drug.

Solutions and ointments of penicillin applied to the eye have likewise caused irritation. These are undoubtedly allergic or hypersensitivity reactions. A curious reaction to penicillin that was administered parenterally has been noted in patients suffering with fungus infections of the skin. Such lesions, especially when present in the groin (tinea cruris) and on the feet (epidermitophytosis), have flared up during administration of penicillin for a number of infections for which it is commonly used.[1]—*55 East Washington Street.*

1. Cormia, F. E.; Jacobsen, L. Y., and Smith, E. L.: Reactions to Penicillin. Bull. U.S. Army M. Dept. 4:694 December 1945.

Pharmacology Of Anesthesia*

By Gustav Wm. Rapp, B.S., M.S., Ph.D.†

This paper, written by Dr. Gustav Rapp, is one that any dentist cannot afford to miss. It is concise and thoroughly readable and yet manages to give one an excellent understanding of the subject covered. This is the first of several papers on anesthesia given as part of a symposium at the annual meeting of the Illinois State Dental Society. Be sure to read it and watch for the others which will appear in subsequent issues.

Anesthesia may be defined in many ways but the one concept that gives the clearest indication of its ultimate nature is to say simply that it is a physiologically reversible condition in which there is an absence of sensations. We commonly subdivide the broad field of anesthesia into several sub-headings such as topical anesthesia, infiltration anesthesia, nerve block anesthesia and general anesthesia. Broadly speaking then, we have either local or regional anesthesia on the one hand or general anesthesia on the other. Occasionally we find analgesia included in the subdivisions and while this may be subject to criticism, technically we do deal with blocking or suppressing pain sensations and hence the working mechanisms are probably closely akin to the other, more legitimate members of the anesthesia family.

It is the opinion of most men who have debated pro and con, that anesthesia in the usual dental office should exclude general anesthesia and gaseous analgesia because ordinarily only the most inadequate facilities for proper preoperative work-up are available and in general only sketchy provisions for post-anesthetic care are provided. This presentation will only concern itself with topical, infiltration and nerve block anesthesia.

Since anesthesia means a condition in which we have no sensations and since sensations are the result of stimuli that have been received by sensory receptors, converted into nerve action, transported over the course of the nerve pathways and finally transformed into recognizable patterns in the brain, it is most likely that anesthesia is a condition in which either the receptors, or the nerves, or certain brain areas are inoperative. For local or regional anesthesia we obviously block the function of either the receptor organs or the nerve pathways. A more far-reaching analysis indicates that local anesthesia such as we usually encounter is a block of the nerve action which joins various structures and not the terminals, because we know that the delicate specificity of receptor organs enables each to respond only to a peculiar type of stimulus whereas we know full well that usual local anesthetics can block all types of sensations which are possible in the restricted areas under consideration. This is true, of course, whether we consider topical, infiltration or nerve block anesthesia. It is true, however, that substances exist which can "anesthetize" a selected sensation and leave the others relatively unaffected. On such substance is Thymoxy-ethyl-diethyl amine which has an affinity for the pain receptors. Such substances are neither numerous nor well-known.

Since our problem of explaining the phenomena associated with local anesthesia involves an interference with the usual action of certain nerves, it behooves us to consider the nature of a nerve impulse first. Early scientific investigators considered a nerve impulse as an electric current which passed along the nerve and excited the end-organs to activity. This concept was soon supplanted by the idea that a nerve impulse consists of a

*This paper was given as part of a symposium on Anesthesia presented at the 83nd Annual Meeting of the Illinois State Dental Society.

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series of polarity reversals along the course of a nerve so that the end result is a wave-like phenomenon of negative electrical potentials. In the light of present-day knowledge, this concept is still inadequate since there are so many observations concerning the nerve impulse, including anesthesia, which cannot be explained on such a purely mechanical basis.

Types of Phenomena

In essence there are two types of phenomena associated with the passage of an impulse along the nerve:

I. Physical phenomena.
   1. Two waves of heat.
      a. initial or activity heat
      b. recovery heat.
   2. Wave of negative electrical potential.

II. Chemical Phenomena. Substances involved in nerve action.
   1. Uses oxygen
   2. Gives off carbon dioxide
   3. Utilizes carbohydrates
   4. Produces lactic acid
   5. Acetyl choline
      a. liberated on stimulation
      b. disappears soon afterward
   6. Phosphocreatine and the adenyl phosphate system.

It is possible to measure the magnitude and speed of the two physical phenomena and they have been shown to be inseparably linked. It has been said that the process of depolarization in the nerve trunk which then would result in a relative negativity, causes the initial heat liberation. This is probably more wishful thinking than truth. If we consider only the facts that the propagation of a nerve impulse is slowed by a drop in temperature and speeded up by increasing the temperature within physiological limits, and that in the absence of chemical reaction within the nerve there is no impulse possible, we are forced to the conclusion that the seat of nervous activity lies in chemical reactions.

This contention becomes plausible when we recognize that the chemical transformations which are known to occur in a nerve are, with perhaps a single exception, the same as those that supply muscles with their energy for contraction. The notable exception is the reaction between acetyl choline and phosphocreatine. Phosphocreatine has long been known as a store house of explosive energy and this energy is liberated during its chemical reaction with acetyl choline, a reaction which is facilitated by a specific enzyme—a complicated naturally occurring catalyst.

Electrical Phenomenon

Such a purely chemical approach even suffices to explain the inescapable electrical phenomenon. We know that an electrical potential difference is generated when acetyl choline is in contact with a lipoid phase. This is a negative electrical potential and, fortunately, of the same order of magnitude as that measured during a normal nerve impulse propagation. With the disappearance of the acetylcholine, the electrical charge also disappears. From this it appears that the existence of the electrical potential difference in portions of the nerve and the presence of acetyl choline are also inseparably linked.

The disappearance of acetyl choline which must take place in order to restore electrical neutrality involves two distinct enzymatically catalized chemical reactions. One is the energy-releasing reaction with phosphocreatine (with the intervention of the adenyl phosphate system). The second mechanism may be thought of as a safety device. In this mechanism acetylcholine is hydrolized to acetic acid and choline with only a little production of energy.

A résumé of the most likely series of events that occur when a nerve is stimulated follows:

1. Any stimulus liberates acetyl choline.

2. Acetyl choline sets up an electrical potential difference between the activated and resting portions of the nerve.
3. Acetylcholine reacts and is removed in two ways:
   a. acetylcholine reacts with water to form acetic acid and choline. There is little energy released.
   b. acetylcholine and phosphocreatine react with the result that large quantities of energy are released. This energy thus made available serves as a source of local heat and is also the stimulus for the adjacent portions of the nerve where more acetylcholine is then liberated which, in turn starts the above series of occurrences.
4. Removal of acetylcholine removes the local electrical potential and thus restores neutrality.

During the subsequent "recovery" period carbohydrates are metabolized to yield the energy which is needed to resynthesize acetylcholine and phosphocreatine for future nerve impulses. It is during this period of resting activity that the second wave of heat travels along the nerve.

Enzymatic Regulation

The reactions which have just been described are all enzymatically regulated. One concept of enzyme action considers three distinct phases which must follow one another. These are:

1. Adsorption of substrate components (substances that are to react) on the surface of the large, complex enzyme molecule.
2. Specific chemical reaction.
3. Removal of changed substances from the enzyme surface, so that phase one is again possible.

All three phases must occur or else no transformation is evident. The first phase depends upon two criteria which substrate components must meet. The surface contours of the reactants must be according to a specific pattern, the counterpart of the active area on the enzyme surface. Then too, the distribution of electrical charges associated with active groups of the substrate components must be arranged so that opposite charges will be adjacent to those on the enzyme surface. *Figure I.* will illustrate this.

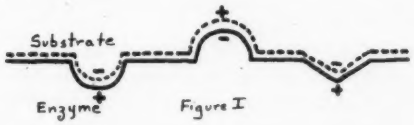


Figure I

If we have either a substance with the proper contours but not the proper charge distribution (Fig. II.), or a substance with the proper charge distribution but not the proper contours (Fig. III.), then no adsorption (phase 1) will occur and hence no enzymic chemical reaction.

Figure II

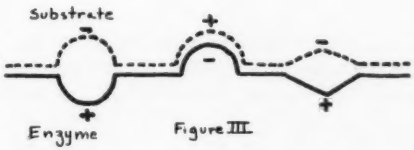
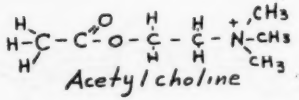


Figure III

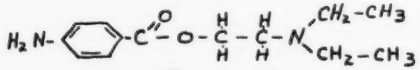
As far as phase 2 is concerned, here we deal with exquisitely specific chemical reactions. In general an enzyme will facilitate a reaction only between two or more particular substances. Even though phase 1, the adsorption, does take place with given substances, if these are not part of the specific substrate for this enzyme, no reaction will take place. Such a substance will block the enzymic reaction because little or no natural substrate can react

as long as the enzyme is bound to this imposter molecule. Such inhibition or blocking of an enzymic reaction is said to be due to structural competition.

It is this type of structural competition by an imposter molecule that explains most satisfactorily the things that occur when a nerve is anesthetized by means of a local anesthetic. Since acetylcholine is one of the key substrate components involved in the chemical reactions of a nerve impulse, we need to look no further than the well-known and often-used procaine molecule to find a plausible imposter molecule which might inhibit the nerve impulse because it might inhibit the release of energy from phosphocreatine. A glance at the essential chemical structures of the two substances makes this clear (Fig IV.).



Acetylcholine



Procaine

Figure IV

If we consider Fig. V. to be the essential structure for proper energy release from this enzymic reaction, we can see that procaine possesses the necessary qualifications for phase 1 of enzyme activity. We might also call this structure the "anesthesiophore," or the bearer or backbone of anesthetics.

Let us examine the procaine molecule in the light of phase 2 of enzyme activity. We see a decided dissimilarity outside the structure we have designated as being essential. These extra-essential atoms making up the procaine molecule make it evident that the normal chemical reaction cannot take place. Dr. Denton has suggested the term "auxo-anestheticon"

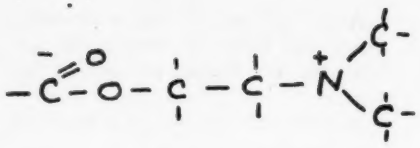
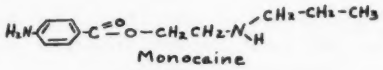
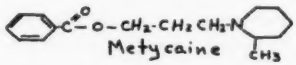


Figure V

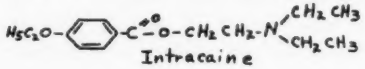
for these auxiliary structures. Because of this dissimilarity, the adsorption of procaine on the enzyme molecules not only does not produce propagation energy but furthermore prevents the normal substrate, acetylcholine, from being enzymically involved in nerve impulse propagation.



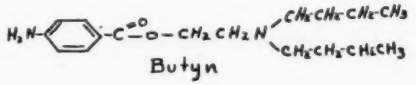
Monocaine



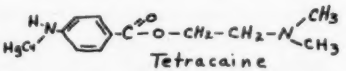
Metycaine



Intracaine



Butyn



Tetracaine

Figure VI

If we recapitulate and use the old and classic "lock-and-key" analogy of Ehrlich we might say that normally acetylcholine is the key that fits the keyhole and opens the lock which releases energy from phosphocreatine. The procaine molecule also fits into the keyhole but cannot open the lock because its beard

has the wrong cuts for the tumblers of the lock. This not only does not open the lock but prevents the correct key from doing so.

A glance at some of the other well-known local anesthetic molecules will reveal that they, too, within reason of course, fit into this simple analogy (Fig. VI.).

This hypothesis can be tested in a rather simple but rigorous way. In the laboratory we can prepare the compound (Fig. VII.): This compound has

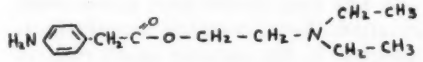
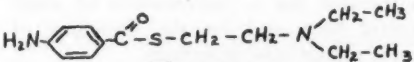


Figure VII

the basic structure that we have designated as being essential. It also has the proper extra-essential outside groups. However, since the interposition of a single carbon group between the benzene ring and the carboxyl caroup, the negative polarity (charge) on this carboxyl group is not of the same magnitude as that of procaine. Hence, while this tailor-made molecule appears to be very similar to procaine it ought not to be a local anesthetic. Clinical experimentation has upheld this supposition.

Another example of a tailor-made molecule is Thiocaine (Fig. VIII.): In



Thiocaine

Figure VIII

this molecule the ester-oxygen has been replaced by a sulfur atom. Since this substitution does not appreciably affect the inter-atomic distances and has a charge similar to the oxygen it replaces, we might expect this compound to behave as an imposter molecule and cause local anesthesia. Indeed, it does!

Practical Problems

With this highly theoretical discussion as a background, we can now approach some practical problems. We may preface this with a discussion of some important requirements of an ideal local anesthetic compound or solution.

1. *A solution of the compound ought to be stable.* This follows from the fact that most practitioners have neither the time nor the inclination to prepare their own solutions. The ready-made solutions obtainable from supply houses must have an appreciable shelf life to be practical.

2. *The solutions or the compounds must be sterilizable.* This is imperative because the drug is introduced into the body. It would be very undesirable to introduce infective materials along with the drug.

3. *The drug must be diffusible.* This is important because even the best of technicians cannot always deposit the solution exactly next to the nerve to be anesthetized. This is obvious from even a cursory glance at the anatomical variations from one body to the next. The drug must, then, be able to pass from the site of deposition to the nerve.

4. *The drug must penetrate into the nerve.* While this point might seem the same as three at first glance, it is nevertheless very different. By diffusion we mean being transported via the body fluids *to* the nerve. Penetration means *into* the nerve. This is essential because the chemical reactions which are to be blocked take place *within* the nerve. It has recently been demonstrated that a local anesthetic molecule can penetrate into a cell only in the form of the uncharged free base form, not in the ionic or salt form. The usual aqueous solutions of the drugs are not free bases however, but salt ions such as hydrochlorides, nitrates, sulfates or borates. This is necessary because the free bases are not sufficiently soluble in water to be practicable. The reason we can get penetration from such ionic salt solutions is that the tissue fluids into which the sub-

stances are injected have a sufficient buffer ability to be able to alkalinize these salt ions of free-base molecules. This behavior, incidentally, also accounts for the fact that some substances like procaine hydrochloride or monocaine hydrochloride are not good as topical anesthetics. These substances require a substantial quantity of alkali for neutralization—more than the normal mucous membrane can supply. On the other hand such substances as cocaine hydrochloride or butyn sulfate exist in the free base form (through hydrolysis) in sufficient concentration to be active topical anesthetics.

Complicating Factor

There is a further complicating factor involved in the problem of penetration. Once the free base molecule has arrived inside the nerve cell, it cannot act as an imposter molecule unless it again carries electrical charges. This requires a second transformation.

5. *The drug solution ought to be self-limiting or be compatible with a limiting agent.* This might seem to contradict the requirement of diffusibility. However, we get anesthesia only by having a sufficiently high concentration so that the imposter molecules far exceed the natural substrate, and hence a high concentration around the nerve is desired. Most of the commonly used local anesthetic compounds are vasodilators, rather than vasoconstrictors. This means that an increased flow of blood is possible in the injected area so that the drug is brought rather quickly to a sub-effective concentration. For this reason most commercial preparations contain either epinephrine or cobefrine or some other such vasoconstrictor substance, to help keep the anesthetic drug in place for an adequate length of time.

6. *The drug ought to be relatively non-toxic.* No matter how carefully a solution is injected some of it will be introduced into the bloodstream. Furthermore, eventually all of the drug will find its way into the bloodstream in some form, since it is the circulation that offers the only pathway for excretion of the drug from the body. There must be a favorable ratio between the effective concentration of the drug and its toxicity.

7. *The onset of anesthesia should be rapid and painless.* Some substances would be good anesthetics but have such a painful onset (that is they stimulate before blocking) that their use would not be tolerated.

8. *The drug should have a reasonable duration.* Even complete anesthesia is valueless if the operator must rush to finish before the sensations return. On the other hand the conditions for which we would desire a very long-lasting anesthesia are exceptional and rare.

9. *The drug should have no undesirable after effects.* Some of the present-day solutions appear to cause post-operative edema and pain but this is most often due to operative trauma and should not be ascribed to the drug. With atraumatic techniques there are almost no post-anesthetic complications.

Misconceptions

These practical requirements of local anesthetic solutions, together with the foregoing theoretical aspects, can all be integrated for a presentation of some useful facts and for the dispelling of some quaint misconceptions.

1. *The working strength of the solution.* This problem has been settled most satisfactorily. As far as procaine hydrochloride is concerned, a 1% or 2% solution is suitable for infiltration. Nerve block usually requires a 2% solution for dental work. A 1½% monocain hydrochloride solution may be used for comparable work. The concentration of intracaine may be reduced to 1% for similar types of anesthetic procedures.

Now and then a practitioner will be faced with the problem of a "missed

block." If he is reasonably certain of the anatomical aspects it may be necessary to raise the concentration of procaine to 4%. However, it must be borne in mind that the toxicity of these more concentrated solutions increases with dramatic suddenness. For instance, we may inject no more than 200 cc. of ½%, 80 cc. of 1%, 25 cc. of 2% and 5 cc. of 4% procaine hydrochloride into a normal patient at a single sitting without severe toxic results. Since the increase in concentration increases the toxicity entirely out of proportion, it is far more desirable to choose a substance with a higher diffusibility, rather than to increase the concentration.

2. *The pH of the solution.* This has been the subject of much controversy. It seems quite true that an "alkaline" solution (or so-called buffered solution) has a faster onset and perhaps a longer duration. However, the solutions are more toxic (because of the higher free-base concentration) and they are not nearly as stable as the acid solutions produced by simple dissolution of the salts. It is not necessary to buffer the acidity of the usual anesthetic salts since the tissue fluids are capable of a ready neutralization. We need only to make certain that the solutions are essentially isotonic. Hypotonic and hypertonic solutions can be painful.

Patient Psychology

3. *"Immunity" to procaine.* Some uninformed operators explain missed nerve blocks as an immunity of the subject towards procaine. With the proper injection technic this "immunity" is impossible as long as our nerves operate with the same mechanisms in one individual as they do in another. For the "indoctrinated" patient who has been told he cannot be anesthetized with procaine, it may be necessary to prove the fallacy of this conception by making a simple intradermal wheal of the anesthetic solution on the fore arm. The patient will readily realize that the same solution that causes insensibility to pain on the arm will also do so at another portion of the body. A human is resistant to procaine anesthesia only if the solution is not in contact with the nerve.

4. *Sulfa drug reversal effects of procaine.* Because of the fundamental mode of action of most of the well-known sulfa drugs, they are rendered impotent in the presence of such substances as para-amino-benzoic acid or members of its family. Amongst these members are many local anesthetic compounds such as procaine, monocaine, butyn and anesthesin. The use of sulfa therapy following anesthesia by such compounds is irrational and dangerous and should be condemned. Even systemic sulfa therapy may be entirely negated by the injection of the quantities of procaine solutions such as are usually needed for routine exodontia.

Sulfa Therapy

If sulfa therapy is needed, then either a sulfa drug must be chosen which is not negated by these aminobenzene derivatives or else a local anesthetic compound must be used which does not influence the sulfa drug. Of the latter, metycaine and intracaine are two good examples.

It is fortunate that the antibiotics like penicillin seem not to be affected by procaine and its relatives. It is also noteworthy that the reverse of the above, that is a reversal of anesthesia by sulfa drugs is theoretically not possible and appears not to take place.

5. *Topical anesthesia.* The need for a good topical anesthetic in dentistry is well recognized. However, many of the preparations available are inadaquate mainly because some of the requirements of the pharmacology of anesthesia are not met. While it must be admitted that when we deal with the mucous membranes of the oral tissues we are concerned with a specialized and difficult to penetrate layer of cells. However, this barrier is not nearly as impenetrable as

has been thought. With our present knowledge about this matter there is not the slightest doubt but that we shall soon have a topical anesthetic preparation which meets most of the requirements. This subject is to be discussed in a future paper.

Anesthetic Accidents

6. *Vasoconstrictors as adjuncts to local anesthesia.* Because most of the popular local anesthetics are vasodilators, substances like epinephrine, cobefrine, desoxy, etc., are needed to localize the injected solutions. These compounds have rather drastic systemic effects when they are introduced into the blood stream. This happens quite often when the anesthetic solutions are inadvertently injected intra-arterially or intravenously. Most of the so-called anesthetic accidents ascribed to procaine or monocaine are in truth referrable to the vasoconstrictor substances that these solutions contain.

Because of their systemic effects, predominantly on the heart and on sugar metabolism, the hazards of giving a patient suffering from a cardiac involvement or diabetes mellitus an injection of a local anesthetic solution which contains a vasoconstrictor are well known. While procaine or monocaine without vasoconstrictors are sometimes used in such cases, the very short duration of such anesthesia makes haste imperative and surgical trauma with its attending dangers more than a potential reality.

The problem can be circumvented by using a local anesthetic substance like intracaine in 1% solution for such operations. This solution is relatively self-limiting and hence may be used without vasoconstrictor. The onset of anesthesia is around 3 to 4 minutes and the duration from 45 to 60 minutes. The drug has a toxicity of the same order as procaine but since it is used in 1% concentration, the margin of safety is almost doubled. It is compatible with the usual vasoconstrictors, if a much longer duration should be desired, but this is ordinarily not necessary.

7. *Anesthetic allergies.* These are possible and in the days when dentists prepared their own solutions the daily slight exposure to the drug was sometimes sufficient to cause allergic manifestations. Most often the allergy is a dermatitis. It must be remembered that the antibodies were not formed against the simple molecules themselves but against the foreign blood proteins that are produced when procaine reacts with either the enzymes or perhaps with the blood proteins themselves. When such allergies exist, it is usually sufficient to change to a different type of anesthetic molecule. For the procaine allergy, it is advisable to change to a drug which is not a derivative of amino benzoic acid. However, any of the local anesthetics can probably sensitize an individual if the proper conditions are presented over an adequate period of time.

BIOGRAPHICAL SKETCH

Gustav William Rapp was born in Germany in 1917 and came to America when he was nine years old. He received his B.S. from Lewis Institute of Technology in 1940; his M.S. from Northwestern University in 1942; and his Ph.D. from Northwestern in 1943. He is assistant professor of Chemistry and Physiology and Head of the Department of Chemistry and Physiology at the Chicago College of Dental Surgery, Loyola University. Dr. Rapp is a member of the Department of Research and a member of the Executive Committee of the faculty there also. He belongs to the American Chemical Society; the International Association of Dental Research; Sigma Xi and Phi Lambda Upsilon, both being National Honorary Scientific Societies.

Illinois Dental Assistants' Association

A large gathering of one hundred fifty were in attendance at the first dinner dance of the Illinois State Dental Assistants' Association which was held early this fall in the Continental Hotel, in conjunction with the Illinois State Dental Society's meeting.

This unusually large crowd listened to a short program of addresses and spent the rest of the evening with dancing and entertainment.

There were among the distinguished guests, Dr. R. W. McNulty, Dean of the Dental College of Loyola University and president of the state society, who expressed his pleasure at being present at such a large gathering and wished the Illinois State Dental Assistants much success. Dr. William P. Schoen, Jr., Editor of Illinois Dental Journal; Dr. Marvin E. Chapin, Illinois State Counselor; Dr. George Hax, Chairman of the Program Committee of the Illinois State Dental Society's meeting; Dr. Clyde West, Chicago Dental Assistants Counselor and Mrs. West. Greetings were extended from national girls, by Lucille Black, president of A.D.A.A. and Margaret Sharp, 1st vice-president of A.D.A.A.

We all enjoyed Dr. Harold Hillenbrand, Editor of *The Journal of the American Dental Association* as our toastmaster.

Because of the outstanding success of this party, it is planned to make it an annual event.

In attendance at the National meeting in Miami Beach, Florida, were Emma Luke, acting 6th District Trustee and Ruth Bates, I.S.D.A.A. President and delegate.

The Annual Dental Assistants' meeting was held in the lavish surroundings of the Roney-Plaza Hotel which was ideally suited for the sessions. The annual banquet was held Tuesday evening, Oct. 15, in the Imperial Room of the Roney-Plaza.

Among the matters of importance of the meeting was the "Proposed Plan for Certification of Dental Assistants."

We wish to take this opportunity to extend our best wishes for success to the newly elected National Officers, and to congratulate our newly elected 6th District Trustee, Miss Marie Johnson from Portage, Wisconsin.

Margaret Sharp, President of A.D.A.A.; Sadie Hadley, 1st Vice President; Katie McConnell, 2nd Vice President; Steve Ann Mills, 3rd Vice President; Aileen Ferguson, Secretary; and Evelyn Britt, Treasurer.—*Florence Sinclair.*

EDITORIAL

CHRISTMAS — 1946

We approach this Christmas, 1946, with mixed emotions. On the material side, prices are very high, the country seems seething with unrest, strikes still abound; we are tired of working hard, especially since March 15 seems to come trampling along right on the heels of December 25; and we have a 'coad in our haid.'

However, this is the first Christmas in years when we have not been at war. This thought alone gives us a deep internal glow. We can hope for a white Christmas without the fearsome black shadow of the past years. The youngsters will have lots of real, honest-to-goodness toys again (not ersatz) with the $10,000 drawn out of the bank; "Adeste Fidelis," early Christmas morning will have real meaning once more. Yes, the bright outweighs the dark and life is certainly good and we are thankful to God for the many fine things which we have, including peace.

RESEARCH FUNDS FOR DENTISTRY

The U. S. Public Health Service, through an act of Congress (Public Law 410), is offering Research Grants to promote research in medicine and allied fields including dentistry. The purpose of these grants is to stimulate study in the health fields by making funds readily available for such research and thus encouraging investigators.

It is a well known fact that all such studies are expensive; this expense is often the chief hindrance to much potentially important research. A directive of the U. S. Public Health Service says:[1] "The purpose of the Research Grants program is to make it possible for workers in medical and allied sciences to expedite and increase the quantity of health-saving and life-saving research. Accompanying this purpose is complete acceptance of the basic tenet of the philosophy upon which the scientific method rests: the integrity and independence of the research worker and his absolute freedom from control, direction, regimentation and outside interference."

The kinds of research which may be undertaken under these grants are varied. The Public Health Service brochure *Research Assistance* says,[2] "Research 'relating to the causes, diagnosis, treatment, control and prevention of physical and mental diseases and impairments of man' falls within the scope of the Research Grants program.

"Included is research in the fields of medicine, surgery, dental diseases, veterinary medicine, antibiotics, bacteriology, biochemistry and nutrition, biophysics, cardiovascular diseases, endocrinology, gerontology, hematology, malaria, pathology, pharmacology, physiology, public health methods, rodent control, sanitation, venereal diseases, tropical diseases, virus and rickettsial diseases, and others."

These grants may be applied for by universities, hospitals, laboratories, other public and private institutions, and individuals. The brochure goes on to say:[3] "It

[1] *Research Assistance:* Research Grants Division, National Institute of Health, United States Public Health Service, Federal Security Agency, P. 1.

[2] Ibid, P. 3.

[3] Ibid: P. 3.

is apparent that under the law no organization or individual is barred from applying for a grant in aid for research in a medical field. Although individuals may apply, the Research Grants Division encourages individual applicants to affiliate with a university, institution, laboratory, or other organization since such affiliation greatly facilitates administration of grants, relieves the research worker of responsibility for bookkeeping and auditing, and provides him with better facilities than ordinarily would be available to an individual."

Applications for grants for medical or dental research must be made on application forms available from the Chief, Research Grants Division, National Institute of Health, Bethesda 14, Maryland. The forms to be filled out by the applicant require information regarding the objectives of the proposed research and a budget plan of proposed expenditures.

Approval or rejection of the application is made by a special Study Section and a National Advisory Council. The procedure is as follows:[4] "Immediately upon receipt by the Research Grants Division, each application for a grant in aid for medical research is duplicated, and a copy is forwarded promptly to each member of the special Study Section of experts in the field in which the proposed research lies.

If an application proposes research overlapping the fields of more than one special Study Section, copies are sent to members of as many Study Sections as may be concerned."

The members of the study sections, themselves specialists in the field, examine the evidence presented; they may also write the applicant or make any other direct inquiries if they wish. Then at a regular or special meeting called for the purpose, the applicants are formally considered. The procedure from this point is as follows:[5] "Action by a Special Study Section on a research proposal may consist of advising: 1. That it be accepted as submitted. 2. That it be rejected. 3. That it be deferred pending further investigation or receipt of additional information.

"In advising any of the above dispositions, Study Section members consider: 1. The scientific merits of the proposed research. 2. Ability and training of investigator. 3. Facilities available to investigator. 4. Such other considerations as the Section members regard as pertinent."

An idea of the scope of these grants may be gained from the fact that there are special Study Sections in antibiotics, bacteriology, biochemistry and nutrition, cardiovascular problems, dentistry, hematology, malaria, pathology, pharmacology, physiology, public health methods, radiobiology, sanitation, virus and rickettsial problems, syphilis, and tropical diseases.

The dental Study Section is composed of the following men: Dr. Paul C. Kitchin, Ohio State University College of Dentistry (Chairman); Dr. H. Trendley Dean, National Institute of Health (Exec. Secy.); Dr. Hermann Becks, University of California; Dr. Harold C. Hodge, University of Rochester; Dr. George Paffenbarger, National Bureau of Standards; Dr. Isaac Schour, University of Illinois School of Dentistry; Lt. Col. Joseph L. Bernier, U. S. Army; Commander Carl A. Schlack (D. C.), U. S. Navy; Dr. Vern D. Irwin, Veterans Administration.

According to the setup of this law, research under these grants will be conducted with full independence and autonomy of the investigator. The use of these funds in no way implies any degree of federal control, supervision or direction of the research project. It seems probable that much excellent research should come from the funds thus allocated by the federal government.—*Wm. P. Schoen, Jr., D.D.S.*

[4]Ibid: P. 4.
[5]Ibid: P. 5.

Philip Sparrow

ON OPERAS AND OPERATING

O toreadoro, don't spit on the floor-a,
Use the cuspidor-a; that's what it's for-a.
—Aria from an old opera.

I always hated opera. First of all, it offended my aesthetic taste. Then it hurt my dramatic. And last, it pricked my realistic. A bastard art form that requires so much of what Coleridge called the "willing suspension of disbelief" should not be allowed to exist. It is hard enough to believe the ordinary play or movie, but to accept the fact that people acted out their lives and destinies in song is very, very thick for me. But that's opera for you—the last, the greatest, and the weakest of all illusions.

But I am a sucker for novelty. At the awful hour of six on a Sunday morning, my favorite uninhibited Brunnhildish friend of the Chicago Opera called me to come down for a dress rehearsal. And I went, arriving there at eight on the dot.

The opera house at that hour is a magic and mysterious place. There were about ten persons there—sitting mummified in the first few rows, in the dark red cushioned silence of the great auditorium. Then down the aisle came a man in a sweat-shirt. He hopped over the retaining wall of the orchestra pit, and landed directly and business-likely on the podium. It was the "general artistic director," who was to direct the orchestra for the day.

The few operas I have seen were not "dress" rehearsals, and as we have said, it was hard enough to believe the illusion even when the actors were in costume. But nothing can compare to an opera done with as little scenery as possible, and the singers in street clothes! The harsh white lights, the frequent interruptions by the conductor as he swore in Italian at someone who hit a wrong note—these were shattering. The chorus went about its own business when not singing: I saw one girl open a paper bag and eat lunch while the aria "Celeste Aida" was being sung. Another was placidly crocheting a doily of some kind. And one of the stars calmly sat on the king's throne and applied a fresh coat of lipstick. When the great portable throne bearing the king was brought in, we could hear him loudly whispering: "Mygawd, you'll drop me, I know you will!"

When I left that early Sunday afternoon, I was quite sure I had attended my last opera. Yet curiously enough, a coupla weeks later—when another "dress" rehearsal was announced—I was right there, sitting absorbedly in one of the front rows. This time it was *Lohengrin,* a long and stuffy thing at best, full of idle song and little action. There was a new conductor who was very precise. He kept continually rapping to interrupt the music, and then he would throw his hands in the air and say, "Can dis be possible? How can dis ting be?" To confuse us more, he started out with the overture to the third act, then called for a singing of the second act, followed that with the first act, and finally went into the third. I was completely confused and exhausted, for the thing had kept us there for five full hours. And I was sure this time I was finished with opera.

Yet the human spirit is a curious thing, always questioning and alive to new experiences. So when my darling Brunnhilde spoke to me about "supering," about standing mutely around in costumes to lend "atmosphere," I once more tumbled. It was *Carmen,* and she got me on the list of supers.

I showed up at seven, trembling a little. I heard my name called, and within moments was being whisked up the elevator to the fifth floor above the stage, where

the men supers dressed. Here all was tumult and shouting, and people climbing in and out of tights and knee-length Spanish breeches with white stockings and black pumps. The costumes looked rather frightful at close range. Gold braid was tarnished, velvet was patched, buttons were off, and safety pins were everywhere.

The costume master handed me a mustard-colored costume: a pair of breeches, a short bolero jacket, a string of red cheesecloth for a necktie, and a salmon colored cummerbund to wrap around my manly form. And a round Spanish hat.

Within a short while I discovered that the breeches were size 46, which is a little large for my svelte thirty-inch waist. I was soon madly fumbling at my rear, trying to pull in the straps and pin myself together. To add to the complications, the buttons were all off on one side of the front. At last a kind old gentleman saw my troubles. "Come here," he said. He applied two safety pins, took an extra long cummerbund, and twirled me into it. Then he took two three-inch folds in my rear, and warned me not to turn my backside to the audience. And we went down to the stage, where a little man rubbed our cheeks briefly with bright rouge, and with a black eyebrow pencil gave us romantic side-burns, and let us go.

It was a wonderful night, especially that second act. My Brunnhilde, strangely metamorphosed now into a black-haired gypsy, squired me to the front of the stage, to the table where Carmen would later come, and Don José. There we sat during the exciting music, while a lusty and wonderful Carmen flirted with me, snatched my wine cup, and then turned her attention to Don José, of course. At the end of the scene, there was almost a tragedy. I did not know she was going to spring on the table to do a brief fandango, and I damned near got a heel in my eye.

Then we were smugglers in the third act, and picadors in the last, carrying banderillos and going to the fights. How many costume changes did it all involve? I dunno, but by the time it was over, I had the feeling that I had handled more safety pins, strange garments, and funny hats than anyone else on the stage. My white cotton sockings were always coming down, and I was always having to pull them up and give 'em an old-fashioned 1920 twist.

I fell again for *Samson and Delilah*. This time I was a high priest, with a smelly wig and goatee, and lots of black lines on my face. The big moment in that came when Samson, blinded in Gaza, pushed aside the pillars of the temple of the god Dagon. Lightning flashed on the stage, thunder roared, and down came the whole she-bang. We all ducked, because when *Samson* was first put on, two stagehands got hit by a column section when a cable broke.

This was on a Friday night. Sucker that I am, I went back for *La Traviata* on Saturday afternoon. Here I was a romantic young dandy, encased in tight brown trousers, a green jacket with a frilly white jabot in front, and a beautifully embroidered vest. This time I made no mistake: I had borrowed a garter-belt from a friend, and my stockings stayed up beautifully. But I had forgotten I had it on in the dressing-room, and it was not until much later that I knew why all the boys were tittering behind my back as I undressed.

Oh, we were such a gallant and polite crew with our white gloves and side-burns, bowing and scraping to all the lovely ladies, while the fragile consumptive Violetta coughed out her life in delicate song. Poor Violetta! Weak as she was, it took her forty minutes of singing in the last act before that brave spirit finally expired.

There you have it, and I hope you'll all be warned by my experience. Long ago, an evening of supering in the ballet *Scheherazade* cured me permanently of my balletomania. I suppose the case is altered, however, with opera. For I had loved the ballet to begin with, and had hated opera. I seem to have begun at the rear end in this instance. And now I think I will put on my red tights, don my black cap with horns, and go out with my staff to scare the living be-jeepers out of little kids. For, look you, do you not recognize Mephistopheles from *Faust?*

HERE and THERE

'Twas the Night Before Christmas 1946

(with due apology to Clement Clarke Moore)

'Twas the night before Christmas, when all through the land
Not a dentist was stirring, not even a toothache was at hand;
The stockings were hung by the chimney with care,
In hopes that St. Nick would leave a quart (of Scotch) there;
The dentists were nestled all snug in their beds,
While visions of Christmas debts danced in their heads;
And wifey dear in her facial cream doing her "One-two,"
While I, in the kitchen, was heisting a few,
When up in the nursery there arose such a clatter,
I gulped, choked, and sputtered, "What the Hell is the matter?"
Away to the stairway I flew like a flash,
Just another Buddy Young in a forty-yard dash.
As I opened the door of the Nursery by force,
I fell over the twins' D—d rocking horse;
And there on the floor I let out a groan,
When up babbled Larry, "Hi, Dad! Hold the phone!
We was trying to see which way was the best
To climb to the roof, and this was the test;
Harry swung out on the window ledge, where
His foot slipped and then the glass wasn't there!
Well, anyway, Pop, we was trying to see
Just who this guy, St. Nick could be.
Now, you wouldn't blame us at all, one mite,
For, after all, this is Christmas Eve night!"
"Oh, no," said I, after coming to,
"You dear little Imps, come here, you two!"
"Now, dear, don't be hasty," came wifey's voice from the door,
"Use that 'Child Patient Approach' here at home a little more!"
As my weary brain heard this uncalled-for advice
For one split second I thought "Murder is too nice!"
Then I turned to the two culprits in crime
And said, "Your Mother came in just in time;
If you expect Santa to make a stop here,
You'd better be good for he may be near;
And if he sees all the damage you've done,
He won't leave you a thing, my Son, and, my Son!"
We tucked them in, then, for the third time that night,
Then made for the stairway and turned out the light.
Downstairs, once again, Mom and I made things perk,
And, success of successes, we made the tree lights work!
For an hour and a half we tinselled and adorned,
And then, as a climax, without our being warned,
The tree toppled and fell———————
And beneath its green branches I gasped out, "Oh, H— Well,

Just one thing more, wifey dear, for the Yuletide cause!"
And we wearily straightened the tree without pause!
At last it was finished, the gifts were in place,
And I could see Happiness there on her face,
But all I could think of was when at dawn's early light
The twins would put to ruin our work of a night!
"Oh, this old St. Nick is one great guy," I said as we "hit the hay,"
"But just 'tween you and me, wifey dear, thank God, there's but
ONE Christmas Day!"

In Towns and Little Towns

As the jingle of Santa's bell is heard again on our city streets, we turn our eyes to the bright horizon of another Christmas season. Driving through our countryside we can see the gala Yuletide decorations hung in the Main Street of every tiny village and community. There comes to mind the "oneness" of the world at this season. . . . Christmas—the season of giving gifts for the pure joy of giving. . . . the season when many, like Della and Jim of O'Henry's "Gift of the Magi," sacrifice the greatest treasures of their house to give some cherished token to their loved ones. . . . Speaking of gifts, we find a certain fascination as we number the various types that have been offered throughout the years. . . . Long ago. . . . The toy and the fruit in a stocking gave our youngsters the thrill of a perfect Christmas morning. . . . A box of candy or a dozen roses was the ideal gift of the suitor to his lady-love. . . . Women exchanged homemade sweets and handmade "fancywork." . . . Today . . . how different the gift . . . the tree is surrounded with gifts of price. . . . Our children are showered with electric trains and dolls and toys of every imaginable type. . . . Exotic perfumes and precious jewels bespeak our devotion to the girl of the hour . . . and the "spirits" of any season bring glee to the eyes of the men who receive them. . . . Yes, the gifts have changed but the Spirit of Christmas forever remains the same bright glowing flame that burns in the heart of the giver. . . . It is that Spirit of Christmas which throws its spark from heart to heart until, throughout the world IN TOWNS and LITTLE TOWNS, it grows and floods the earth with the light of truth. . . .

"Peace on Earth to Men of Good Will"

As brilliant as the Star that led the Magi to their King is the glory of a world freed at long last from the shackles of actual combat and blood and death. . . . The dawn of a new generation awaits the coming of the Prince of Peace and the expectant breath of a new life dreams of the New Year of true and lasting peace to come! True, we are still buffeted by the tail-end whirlpools of war time economy, and we may have to patch up the old car with a new battery and tires and nurse it through another cold winter, and the old overcoat may have to do another year, the desired fur coat for milady will have to be put on the waiting list, and the house of dreams may still be our castle in the air, but with it all this will be the *Best* of all Christmases! . . . The little things that make up a real Christmas will be ours again, . . . the good natured bartering of shoppers as they call the seasons greetings to one another, the picture of the fancyful and beauteous Christmas decorations that meets the eye at every turn of the head . . . the fantasy of the Christmas tradition told in the department store windows and mirrored there, the wondering awe-filled eyes of children and the memory filled eyes of "grown up boys and girls" . . . the untold symphony of Christmas carols as they tell of "The Birthday of the King" . . . the inner peace which descends over the family circle as we watch the tree in all its decorated splendor as it is lighted for the first time . . . the deep swelling of our hearts as we join the family at Christmas worship . . . the gaity of the family at the Christmas dinner table. . . . Yes, all this is ours because once again there is "Peace

(Continued on page 529)

The President's Page

By R. W. McNulty, D.D.S.

Just one year ago your president presented his first page to the JOURNAL in the form of a Christmas greeting. Today he finds himself writing his final president's message during the same season.

This has been our first full postwar year, during which many problems have arisen in the administration of the Society's affairs. There has been derived, however, a keen sense of pleasure in coping with them. There has been the opportunity of working with an understanding and cooperative group of officers and committeemen, all of whom have made great contributions to the progress of dentistry in Illinois. There has been that great advantage of making new and cementing old friendships not only in Illinois, but over the nation.

Appreciation for membership in organized dentistry has been evident during the year. Our Society now boasts of approximately 5200 members, the largest in the history of Illinois dentistry. For the first time in a quarter of a century, our annual meeting was held in Chicago and from all aspects the meeting was a success.

We may now expect to see a definite program in the field of dental health education in our state. The war deprived us of a chief of the dental division in the Illinois State Department of Public Health. A new director of the state dental program, one with an understanding experience in the field, has been secured, and we foresee consummation of a program which will bring to the public a more comprehensive realization of the value of dental health.

A postwar development was the program for dental health under the Veterans Administration. With a program wide in scope and a fee schedule of adequate nature, Illinois can be proud of the fact that over 65 per cent of its ethical dentists have applied for the status of "participating dentist," and the applications are still coming in.

Your president, and he is sure it may be said for the other retiring officers, leaves his administrative responsibilities more with a sense of regret than joy. To him the year has been a profitable one which cannot be measured in intrinsic value. He leaves only his administrative responsibilities, but will continue to assume the duties of lending his efforts to an advanced dental health and a better profession in the state.

To the new officers, who will assume their duties in mid-January, go the best wishes for a successful year; to the members of our Society, a joyous Christmas and a very prosperous 1947.

BOOK REVIEW

Dentistry—An Agency of Health Service. *By Malcolm Wallace Carr, D.D.S., Director of Oral Surgery and Visiting Oral Surgeon, Metropolitan Hospital, Attending Oral Surgeon, St. Luke's Hospital, Knickerbocker Hospital, Polyclinic Hospital, Flower-Fifth Avenue Hospital; consultant Oral Surgeon, Roosevelt Hospital, New York; Lecturer in Oral Surgery, Graduate School of Medicine, University of Pennsylvania, Philadelphia. Pp. 216. Cloth. Price: $1.50. Commonwealth Fund New York, New York. . . . 1946.*

This very simply, yet compactly written book presents a thorough picture of dentistry—giving pertinent facts and depicting how dentistry has progressed from the limitations of a "biomechanical craft" to its present professional status. Information is given on requirements for training: past and present problems with suggested solutions and goals to be reached from the dentist's point of view.

The first century of dentistry has just been completed and the contributing authors (who are outstanding in their field) are able to trace the advancement, by specific illustrations, made in practice and research, growth of professional dental organizations and periodical literature plus the establishment and development of systems of education and state legislative regulation.

The most urgent socio-economic problem of dentistry is the development of a satisfactory procedure that would make available to every person, in a convenient and rapid manner, "the benefits of adequate protective, restorative and surgical dental health care." Special conditions which seem to obstruct this goal include:

1. Lack of desire for such care which could be attributed to ignorance of the necessity of dental health or laxity on part of the individual.

2. Poor distribution of dentists throughout the country.

3. Comparatively high cost of dental care due to the necessity of individual manual treatment by the dentist.

Other current problems discussed include obstacles to dental health insurance, the dire need for a greater number of competent workers plus an increased financial support for their efforts.

All in all a very complete picture of dentistry in all its phases and its place in the health service is depicted by a very able group of authors, giving pleasant yet valuable reading material to the dentist or non-professional.—*Francis A. Napolilli, M.D., D.D.S.*

Francis A. Napolilli. Received his B.S. from Loyola University; his D.D.S. from the Chicago College of Dental Surgery; and his M.D. from Loyola Medical College. There followed a period of Residence at Cook County Hospital, Chicago, in the Departments of Maxillo-facial, plastic surgery and ear, nose and throat. He is a member of Delta Sigma Delta and Phi Beta Theta fraternities. He was recently discharged after serving in the United States Army Medical Corps as Maxillo-facial and plastic surgeon for forty-five months including eighteen months in the European Theatre of Operations. He is a member of the Chicago, Illinois and National Medical and Dental Societies.

CURRENT NEWS AND COMMENT

REPORT ON GRADUATIONS OF DENTAL SCHOOLS

Dental schools in the United States graduated 2,666 new dentists during the 1945-46 school year, the Council on Dental Education of the American Dental Association reported recently.

This total of new dental graduates is the second largest in recent history of the profession and reflects the accelerated training program adopted by dental colleges during the war years.

The war-time peak of dental graduates was reached in 1944-45 when 3,212 dentists received diplomas.

During the five years prior to the war, the Council reported, the average number of dental graduates was only 1,712 per year.

Although the number of graduates increased during war years, enrollments of beginning dental students dropped sharply due to manpower demands of the armed forces. This decline in enrollment will result in smaller graduating classes during the next two to three years, the Council reported.

Present freshman enrollment at the nation's 40 dental schools, however, is in excess of 3,000 students, the highest in twenty years. Approximately 90 per cent of the beginning dental students are veterans of World War II.

DENTAL FELLOWSHIPS OFFERED AT U. OF I.

Applications are being accepted at the University of Illinois College of Dentistry for two dental research fellowships made available by the United States Public Health Service for the study of periodontal disease.

Complete information may be obtained from and applications directed to Dr. Isaac Schour, College of Dentistry, University of Illinois, 808 South Wood Street, Chicago 12.

In a recent study in Italy, conducted after the cessation of hostilities, Dr. Schour and Dr. Maury Massler noted that the Italian population suffered less from decay than the American population but more from periodontal disease (pyorrhea).

Whereas U. S. dental authorities have established an accepted index (DMF—decayed, missing, filled) for determining the extent of decay, no comparable index has been set up for determining gingival (gum) disease.

To work toward this end, the public health service, at Dr. Schour's suggestion, has granted $11,000 and established the two fellowships. Accepted applicants may also do part-time work toward a graduate degree.

TESTIMONIAL DINNER FOR DR. PINNEY

Friends of Dr. Harry B. Pinney, long time General Secretary of the American Dental Association, will extend a testimonial dinner to him on the night of December 12 at the Chicago Athletic Club. Dr. Pinney retired after the last annual meeting of the American Dental Association after nineteen years of service. Prior to becoming General Secretary, Dr. Pinney was active in the Chicago Dental Society and in the Illinois State Dental Society, holding many important offices.

The following members of the Ticket Committee have tickets available:

North Side: Arthur W. Blim and D. Munger Hodgman

North Suburban: Edward J. Ryan and R. B. Mundell

Northwest: Glen E. Cartwright

West Suburban: Werner Gresens

West Side: Earl P. Boulger

Kenwood: Harry A. Hartley

South Suburban: L. W. Hughes
Englewood: Lester E. Kalk
Fraternity: Harold Oppice
Central Office: John J. Hollister

Dr. Frank Hurlstone is chairman of the Arrangements Committee. Tickets are six dollars per person. Dinner will be served at 7 p.m. following a fellowship hour at 6 p.m. All friends of Dr. Pinney are cordially invited to attend.

DR. H. B. WASHBURN A.D.A. PRES.-ELECT

Dr. H. B. Washburn, of St. Paul, Minnesota, is the new president-elect of the American Dental Association. He was elected by the House of Delegates at Miami, October 16, to succeed Dr. Sterling V. Mead, of Washington, D.C., who became the new president of the Association.

Dr. Washburn was born June 8, 1884, at Red Wing, Minnesota. He was graduated from the Dental School, Northwestern University, in 1905 and entered general practice in Zumbrota, Minnesota. In 1914 he went to St. Paul, where he is now engaged in the general practice of dentistry. He is a former president and secretary of the St. Paul District Dental Society and is a former president of the Minnesota State Dental Association. In 1926, he was chairman of the Full Denture Section of the American Dental Association. In 1940, he was elected a member of the Board of Trustees from the Tenth District and has served two terms.

Dr. Washburn will be installed as president of the American Dental Association at the close of its 1947 meeting in Boston, Massachusetts.

URANIUM ISOTOPES STUDIED CAREFULLY

The possibility of obtaining relatively large amounts of radioactive isotopes from the uranium piles of the Manhattan District brings basic biologic investigation ot a new frontier. The Office of The Surgeon General will supervise the distribution of these materials to Army hospitals. Requests for these materials should come from accredited research groups or educational institutions and should be directed to Isotopes Branch, Research Division, Manhattan District, P. O. Box E, Oak Ridge, Tenn.

In contrast to the microscope and the X-ray, which were useful in the study of the organs of life, the isotopes throw light on the processes of life, such as how calcium and phosphorus are used in building the teeth and in uniting fractures, how iodine is used by the thyroid gland, what happens when one or more of the glands of internal secretion fail to function properly, and how wounds heal. Elements such as calcium, phosphorus, and iron can be tagged with small amounts of the isotopes and followed in the body through the emission of beta and gamma radiation.

Some of these radioactive isotopes may find a place as therapeutic agents. The most notable example to date is radioactive phosphorus, known chemically as P_{32}. When it is administered, the blood stream is subjected to a radiumlike bombardment. Consequently, when it was produced about 7 years ago, there were high hopes that it might cure leukemia. It brings about long remissions of the disease, but cannot be considered a cure. Nevertheless, it is now generally accepted as the treatment of choice for certain forms of leukemia.

REVISION READY OF A.D.A. "STORY"

Revised editions of the booklet, "The Story of an Association," which describes the origin and development of the American Dental Association, are being distributed by the Bureau of Public Relations.

The new edition contains 26 chapter headings ranging from a short history of organized dentistry to a complete summary of current activities of the Association, its committees, councils and bureaus. Included are outlines of the Association's governmental structures, a

special chapter of finances showing major sources of income and principal expenditures, and descriptions of functions of each department. In all, the booklet's 64 pages provide a thorough view of professional activities of interest to all dentists.

Copies may be secured free of charge by sending a postal card request to the Bureau of Public Relations, American Dental Association, 222 East Superior Street, Chicago.

SPECIALISTS' SYMPOSIUM GIVEN AT U. OF I.

Eight specialists from dental schools in Chicago conducted a symposium on preventive dentistry November 25 and 26 as a climax to the University of Illinois' second 12-week refresher course in clinical and pre-clinical dentistry and wartime developments.

On November 25, Dr. A. O. Gruebbel, American Dental Association, Dr. L. S. Fosdick, Northwestern University, and Dr. R. G. Kesel and Dr. Maury Massler, University of Illinois, discussed preventive dentistry from the viewpoint of public health, nutrition, biochemistry, and bacteriology.

On November 26, Dr. J. Blayney, University of Chicago, Dr. B. Orban, Loyola University, Dr. G. M. Teuscher, Northwestern, and Dr. A. G. Brodie, University of Illinois considered caries, periodontal disease, orthodontia, and children's dentistry.

A similar symposium will be included in the third dental refresher course at the University of Illinois, beginning January 6. A similar roster of outstanding teachers and investigators will appear at that time.

Applications are now being accepted for the third course. They should be directed to Dr. Isaac Schour, College of Dentistry, University of Illinois, 808 South Wood Street, Chicago 12.

A maximum of 36 students can be accommodated. These courses were designed primarily but not exclusively for dentists returning to private practice after service in the armed forces.

A.D.A. BOOK NOW READY

The 1947 A.D.A. Appointment Book, published by the Bureau of Public Relations of the American Dental Association, is now available to all members. The new book includes a variety of exclusive features. A full week's appointments may be listed on a double page. It provides for a patient recall system and contains a catalog of books on dentistry available at the A.D.A. library, a separate catalog of dental health educational literature, and a list of local anesthetic agents and dentifrices acceptable to the Council on Dental Therapeutics. Copies may be ordered from the Bureau of Public Relations, American Dental Association, 222 East Superior St., Chicago. The book sells for $1.50 a copy.

ATOMIC BOMBS STUDIED FOR EFFECTS

Investigation of the results of atom bomb bursts over Hiroshima and Nagasaki revealed that no harmful amounts of persistent radioactivity were present after the explosions. The effects of the atom bomb on human beings were of three main types: (1) Burns, including flash burns caused by the instantaneous heat and light radiation, remarkable for the great ground area over which they were inflicted. (2) Mechanical injuries, resulting from flying debris, falling buildings, and blast effects. (3) Radiation injuries, due entirely to gamma rays and neutrons emitted at the instant of explosion and similar to the results of severe X-ray overexposure.

The preliminary estimates that the general effect of 1 atomic bomb was equal to an explosion of 20,000 tons of TNT were borne out by the investigation. Hiroshima suffered 135,000 casualties, which included more than 50 percent of its population. It was comparable in size to Providence, R. I., or Dallas, Tex.

Nearly half, or 66,000 of the casualties were deaths, the greatest number of which occurred immediately after the bombing. Nagasaki, a city of 195,000, suffered 64,000 casualties, of which 39,000 were deaths. Burns caused about 60 percent of the deaths in Hiroshima and 80 percent in Nagasaki. Falling debris and flying glass caused 30 percent of the deaths in Hiroshima and 14 percent in Nagasaki.

DR. STERLING V. MEAD NEW A.D.A. PRESIDENT

Dr. Sterling V. Mead, of Washington, D.C., is the new president of the American Dental Association. He was installed at the close of the 1946 meeting of the House of Delegates at Miami, Florida, succeeding Dr. Walter H. Scherer of Houston, Texas.

Dr. Mead was born Oct. 16, 1888, at Hutchinson, Kansas, where he attended the public schools and the Salt City Business College. He received his dentistry degree from George Washington University in 1914 and was awarded his bachelor and master's degrees in science at Georgetown University. In 1929 he was president of the District of Columbia Dental Society, and in 1932, served as vice-president of the American Dental Association. For several years, before being named president-elect in 1944, he served as chairman of the Association's committee on legislation. Dr. Mead has engaged in the practice of oral surgery in the nation's capital for many years.

RETURN QUESTIONNAIRE ON CHILD HEALTH SERVICE

The Illinois Study of Child Health Services is in full swing. This Study has been undertaken by the American Academy of Pediatrics on a nationwide basis in the belief that physicians and dentists share the responsibility in planning for the future health care of children.

In order to fulfill this responsibility, the Academy has committed itself to the task of determining the facts concerning the extent and availability of existing facilities for the health care of children as the first step towards the development of sound plans for better and more evenly distributed child health services.

The ultimate success of this Study and its influence on the future of child health care depends upon each physician and dentist.

Questionnaire schedules have been distributed to all physicians and dentists in Illinois. Your cooperation in accurately filling in and returning this short form will materially aid in making the Illinois Study 100 per cent successful.

HERE AND THERE

(Continued from page 523)

on earth!" The story books are opened once again to read to the eager youngsters the story of Santa and his reindeer; of Tiny Tim's "God Bless us, everyone!"; of the repentant Scrooge; of Della and Jim and their wisdom of extravagance; and above all the traditional beauty of the Christmas story of how "They wrapped Him up in swaddling clothes and laid Him in a manger, because there was no room for them in the Inn"; and once again we send our Christmas greeting to all in the words of the angel "Peace on Earth to men of Good will!" Of course after such a wish we know it will be a perfect HAPPY NEW YEAR!—*Gerard J. Casey, D.D.S.*

COMPONENT SOCIETIES

CHICAGO

The last meeting of the Chicago Dental Society was held on November 19, at the Stevens Hotel. President Robert I. Humphrey, who just returned from his twenty-fifth annual pheasant hunt, opened the meeting. After a short business session he turned the meeting over to the program chairman who is also President-Elect of the Illinois State Society, Dr. Robert Kesel.

Dr. Kesel did an excellent job of obtaining a program that he presented Dr. Ralph Ireland of Lincoln, Nebraska. Dr. Ireland is a past-president of the American Society of Dentistry for Children and is Professor of Pedodontics at the University of Nebraska. He gave a practical illustrative discussion of the management of children and cavity preparation and filling.

In the past month Dr. Kesel has given many lectures on "Dental Caries." He spoke recently before the Waukegan group and the Peoria group and on December 18 he addressed the Fox Valley district at the Baker Hotel in St. Charles.

On December 12 a dinner was held at the Chicago Athletic Association in honor of Dr. Harry Pinney who just retired as Executive Secretary of the American Dental Association. Dr. Frank Hurlstone, chairman of the dinner committee presented Dr. Pinney with a radio in testimony of his many years of faithful service.

Our congratulations to Dr. Harold Hillenbrand who succeeds Dr. Pinney.

At our next meeting on December 17, Dr. Harry Sicher will speak on the "Propagation or Spread of Dental Infection." He will outline the "Danger areas of Hemorrhage," "Mandibular Articulation," and "Accessory Pulp Canals." Dr. Sicher is Professor of Anatomy and Histology at Loyola University School of Dentistry and his subject "Anatomy in the service of Practical Dentistry" should be very interesting.

Mr. Russell Hegland, executive secretary of the Chicago Dental Society informs me that the next Mid-Winter meeting on February 10-13, 1947 will probably see the largest attendance in history. The Stevens Hotel is already out of reservations so if you are planning on attending sit down right now and make reservations at some other hotel.

See you at the next meeting.—*Joseph M. Lestina D.D.S.*

WARREN

The Warren County Dental Society met Monday November 18, in Monmouth, to hear a very complete and informative address by Dr. H. M. Camp of Monmouth, Secretary of the Illinois State Medical Association.

Dr. Camp has a wonderful fund of information about the necessity of maintaining freedom in medical and dental practice, that America may continue to be preeminent in progress and leadership in national health matters.

Write to National Committee of Dentists, 75 East Wacker Drive, Chicago 1, Illinois, if you want a very informative book that will tell you the facts about compulsory health insurance, with its menace to freedom in our chosen line of work. This book will be sent to you upon request, and every dentist should have one since it is full of vital facts.

It is with sadness that we record the death of a prominent member of our Dental Society; that of Dr. Richard Edward Barnard, of Monmouth, who has practiced here since 1938. His death came suddenly, the result of a heart attack. His loss comes as a distinct shock to his many friends and to us especially, his fellow dentists.—*H. W. McMillan.*

EASTERN ILLINOIS

The Fall Meeting was held in the Chamber of Commerce rooms, Charleston, October 17, 1946.

Table Clinics, presented by several of our members, provided an interesting and enlightening afternoon. Such local talent we long suspected—what with Bill Tym and Acrylic Jackets, George Kennedy and that old lower problem solved by Muco-Static techniques; Bill Podesta illustrating and discussing details of acrylic eye fabrication a la U.S. Army; Don Butler and his practice management hints; C. L. Hine, Herman Lumpp, G. O. Ruff, Henry Gressens, Mel Lessman and W. E. Sunderman with their pet techniques. How could the afternoon have failed? However, we all missed the one technique we went to see—Dave Baughman removing the stone cast from a newly processed denture. Oh well, there will be another time. Incidentally, Dave was attending the House of Delegates in Miami.

After a fine chicken dinner, arranged for by Bill Tym and his Charleston cohorts, Dr. Ralph Phillips of the University of Indiana School of Dentistry presented an illustrated lecture treating with small castings. The presentation aided in better undersanding of the fundamentals involved and aid in elementary casting difficulties such as wax manipulation, sprueing, investments, treatment of metals, distortion, etc.

Dr. George Kennedy forecasts an interesting winter of Study Clubs. The first of the series will be Nov. 7th at the U.S. Grant in Mattoon. Thirty-seven of our forty-seven members have signified their intentions of attending so we should have some interesting Thursdays.—*Tom McMeekan.*

DECATUR

The Decatur District Dental Society has planned a testimonial dinner for Dr. L. H. Dodd, president-elect of the Illinois State Dental Society, on January 16, 1947, at the Orlando Hotel, Decatur, Illinois.

We feel very proud of Dr. Dodd and his achievements for dentistry through his work in the Illinois State Dental Society. We are endeavoring to show our feelings by this testimonial dinner. Knowing that many of Dr. Dodd's friends would like to attend, we extend a welcome to all the members of the Illinois State Dental Society who would care to participate.

Dr. Harold Hillenbrand, Editor of *The Journal of the American Dental Association*, will be our guest speaker of the evening. If you care to attend, please fill out the reservation slip below and return. —*T. J. Campbell, D.D.S.*

TESTIMONIAL DINNER

(Dr. L. H. Dodd)

DATE.....January 16, 1947
6:30 P. M.

PLACE.....Orlando Hotel
Decatur, Illinois

RESERVATIONS

Dinner .....

Room Accommodations.....

Signed.....

Please return to Dr. T. J. Campbell, Program Chairman.
667 Citizens Building Decatur 30, Illinois

FIRST CLASS MAIL

Illinois Dental Journal,*
6355 Broadway,
Chicago 40, Illinois.

Today there is a strong Nor'wester blowing and I sit on my perch close to Lake Michigan and look out over the water. It is rippled as it always is when there is a strong off shore wind. If Mr. Sparrow had nested along the lake as many years as I have, he wouldn't have said "Nor-wester" when he should have said "North-easter" in his otherwise excellent item about Chicago. I'm sending copies of his article to some Chicagoans who have temporarily migrated elsewhere—just to make them homesick.

With sincere admiration of Mr. Sparrow.

Dr. L. H. Jacob,
Secretary,
State Dental Associations
Jefferson Building,
Peoria, Illinois,
U. S. A.

Dear Colleague:

I have the pleasure to inform you that we have formed an all India Dental Association which will speak for all the dentists of India. All other existing associations have been liquidated so that we have only one Association with branches all over India. Ours is the Provincial branch for the whole of Bombay Province and we will be very glad to have the support and co-operation from the dental association all over the world. Ours is a new venture and our immediate aim is to have a dental register so that quackery is abolished completely and then to make the public dental minded. On the scientific side we will encourse research work and for that open libraries. Naturally, in our initial stage it is impossible for us, handicapped, as we are by lack of funds or any help from the State to open a big library but gradually we hope to build up a good library. In this aim of ours we shall be very grateful to you if you could supply us with a copy of your magazine. We are sorry we are in no position to reciprocate it just now as we have no magazine of our own but when we do have one, we will be only too glad to send you regularly copies of the same.

I shall be also happy, if you will kindly supply us with a copy of Constitution and By-Laws of your Association and supply us with scientific papers whenever you publish them. Our Constitution and By-Laws are in print, and as soon as they are ready I shall send you a copy of the same.

With fraternal greetings.

Yours sincerely,
(Signed) Dr. H. D. Merchant
Hon. General Secretary

*Because of the nature of this letter, we are deviating from our usual practice of publishing only signed communications.

Illinois Dental Journal,
6355 Broadway,
Chicago 40, Illinois.

I can't understand why some dentists are so excited over a little boom practice; or are they excited or is it just baloney by the university heads trying to replenish the student body.

It has been only a few years since they were crying about the under-fed and under-paid dentist. This is the first time in the history of dentistry that the profession has enjoyed prosperity.

Illinois has 1329 persons per dentists —so what? If they all wanted to see a dentist, which they do not, one dentist could see each one three times during the year and still have Sunday and one day a week off and two weeks' vacation. Figure it out with about 16 or 18 patients a day —which any active dentist can do. Don't get excited, light an Old Gold and let the dentist help pay off the war debt and feed the politicians.

With the scarcity of housing and water supplies and all commodities, plumbers, carpenters and electricians are not crying for fear they cannot supply the demand.

No, what these kids want to fill those cavities is candy and they will get money to buy the candy to fill them.

Very truly yours for an uncrowded dental field,

(Signed) John H. Richardson,
1005 Belmont Ave.
Chicago 13, Illinois.

Dr. William P. Schoen, Jr., Editor
Illinois Dental Journal
6353 N. Broadway
Chicago, Illinois

Dear Doctor Schoen:

Although the question of the licensing of Dental Hygienists in Illinois has been under discussion for a long time, the discussion has been restricted to a relatively small body of men. The idea of widening the group of participants prompts the writing of this letter.

The majority of dentists in Illinois seems to approve of the creation of license in Dental Hygiene. The educational requirements for this status are now the center of discussion. While, at first, graduation from high school and two years of practical education in a dental school were considered adequate, the tendency now is to raise the requirements to two years of college and two or three years in a dental school. This change was proposed in order to make the Dental Hygienist able to participate in the educational program of preventive dentistry, for instance by giving lectures and instruction in primary and secondary schools.

Although the educational work of the Dental Hygienist would be highly welcome, it would entail so long a professional preparation that it would necessarily raise the earning expectations of the Hygienists to such a level as to make their services inaccessible to the average dentist and his patients. This, of course, would defeat the primary purpose of educating the Hygienist as an aid to the dentist. It must also be considered that all developments in the direction of making the best dental service available to a more and more restricted group in the higher income brackets inevitably will lead to a louder outcry for socialized dentistry.

Would it not be possible to keep the requirements for Dental Hygienists at the present level and to institute something like a graduate course for Hygienists who have the educational background and are capable and willing to enter the educational field of Dental Hygiene?

Sincerely,
(Signed) Balint Orban, M.D., D.D.S.

Dr. William P. Schoen, Jr., Editor
Illinois Dental Journal
6355 Broadway
Chicago 40, Illinois

Dear Dr. Schoen:

It would be appreciated if the following letter in its entirety be published in the next issue of the Illinois Dental Journal.

Authorization of dental examinations to determine need for dental treatment for veterans will be expedited through a temporary program being put into effect by the Dental Division of Branch No. 7 of the Veterans Administration.

Due to personnel shortages in each of the Veterans Administration Regional Offices of Illinois, Indiana, and Wisconsin, it has been impossible to issue the formal letters of authority for dental examination in sufficient numbers to cut into the backlog of approximately 60,000 applications for dental treatment filed by veterans in the three states which comprise Branch No. 7.

Under this temporary plan which is not to be confused with the regular procedure as outlined in the Participating Dentists program, letters of authority in duplicate for dental examination and full mouth X-rays of not less than fourteen films together with a blank VA Form 10-2570 "Dental Examination and Treatment Record" will be mailed to eligible veterans. The veteran will be instructed to present these papers to any participating dentist on a fee basis who may then make the examination and X-rays

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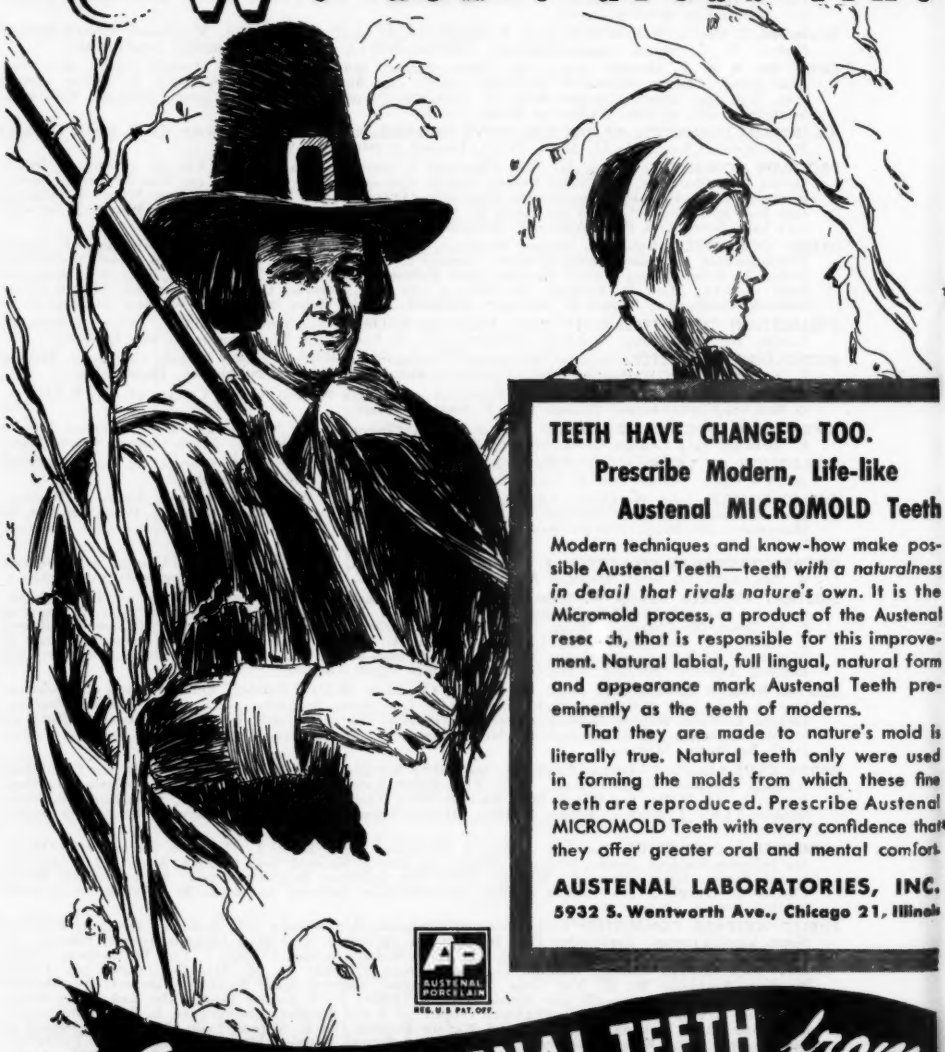

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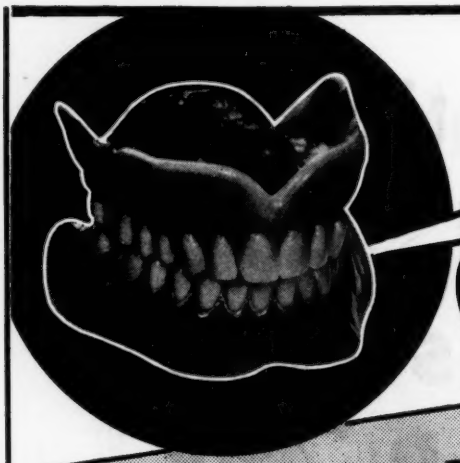

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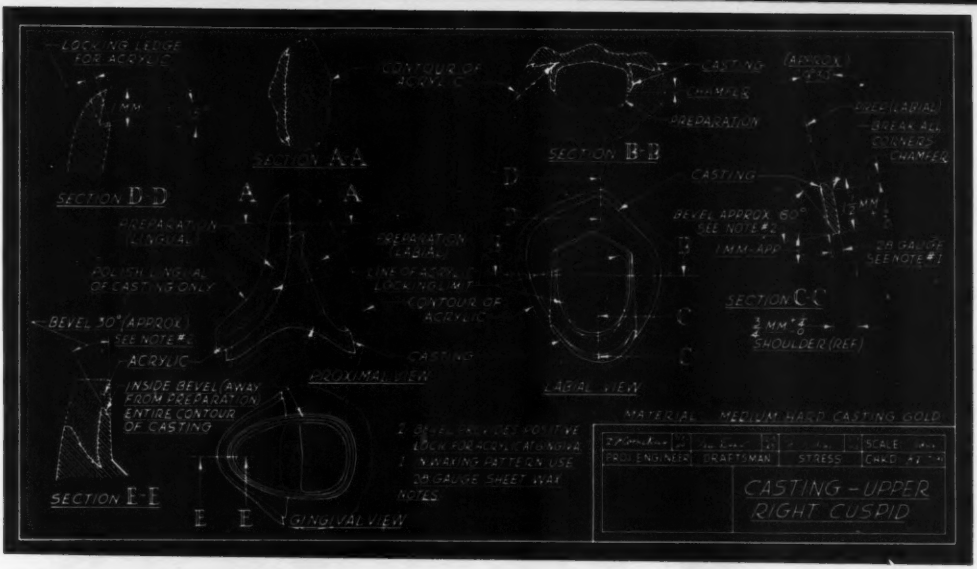

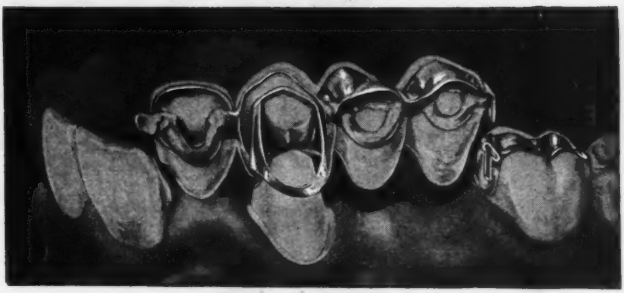

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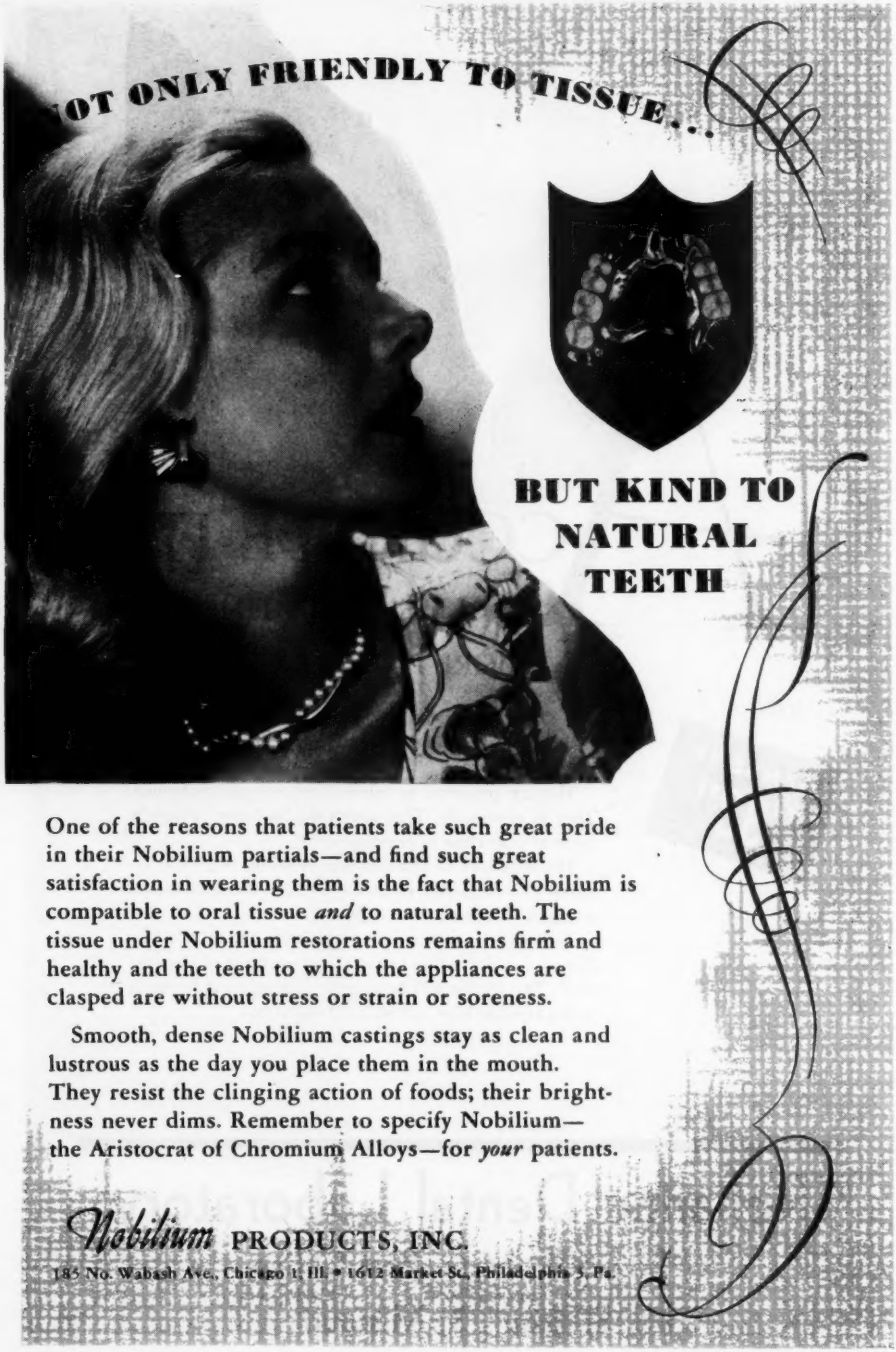

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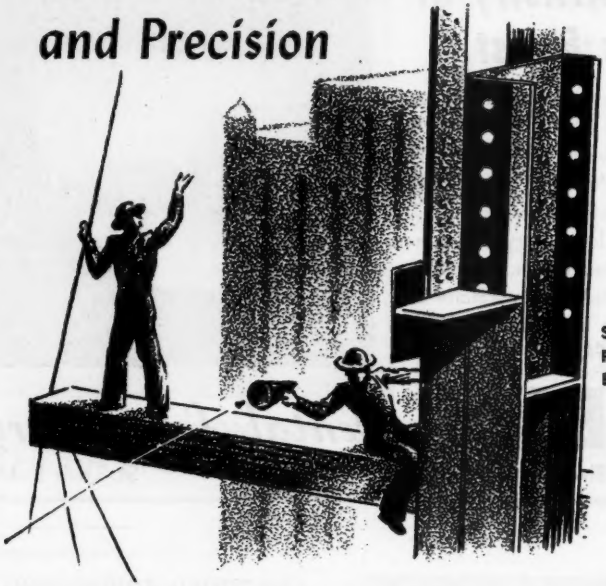

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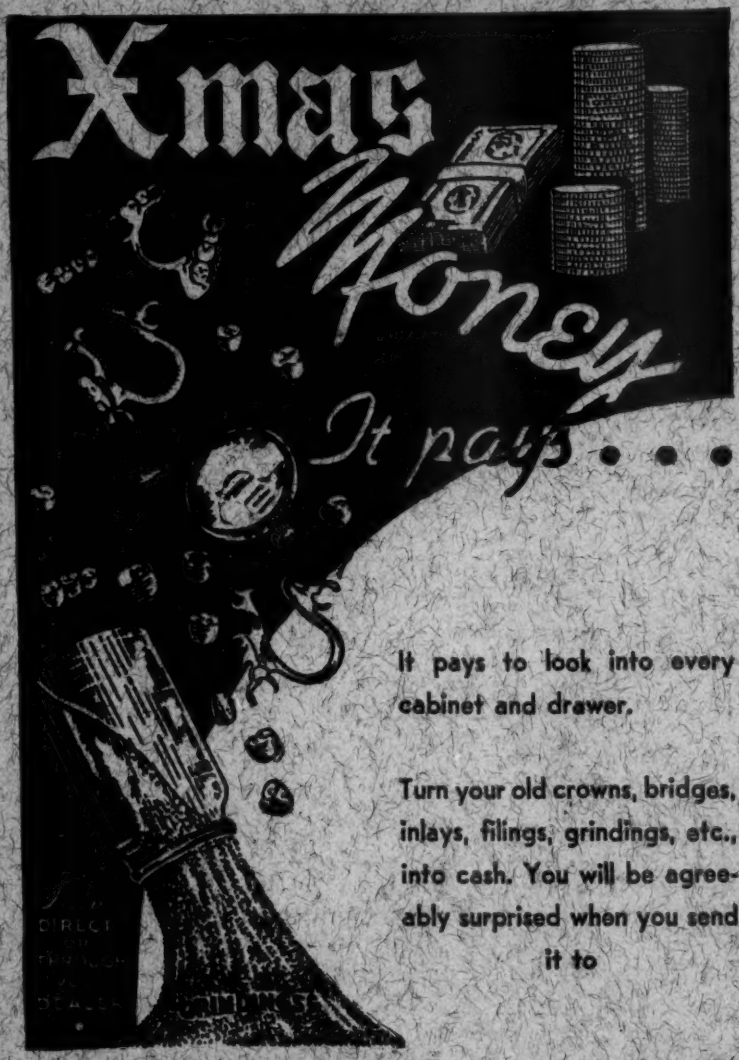

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